

# COMPUTERWORK

## THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper Second-class postage paid at Chicago, Illinois

Vol. VI No. 3

January 19, 1972

Price: \$9/year

### Independent Disk System User Is Satisfied Customer

By Denny Goss  
CW Correspondent

Just how good are the much publicized replacements for IBM's 2314 and the independents' double density disk storage systems? Very good, and in many cases better than the IBM units, a recent survey revealed.

Surveyed were users in banking, finance and insurance, from colleges, government, and firms in manufacturing, research and service.

These organizations employ equipment from Ampex, Calcomp, Marshall Data Systems, Memorex, Potter and Telex. Almost all selected the equipment primarily for its price advantage over comparable IBM units, and all carefully investigated service available

before making a decision. Several said the decision paved the way for the use of more independent peripherals.

A Calcomp user, for example, conducted detailed studies comparing Calcomp equipment with the

#### Spotlight Survey

2314. The faster access time of the Calcomp system resulted in 4% less lapsed time, an advantage that, when combined with price, is a good recommendation for the independent equipment.

A spokesman for the user said the lower price alone means an annual savings of \$80,000 to \$120,000. The

increased performance would mean still more savings. The Torrington Manufacturing Co. of Torrington, Conn., is a user of Marshall Data Systems' replacement units and has them interfaced to a 360/40 along with 2314s.

Robert Manion, the firm's manager of computer operations, reported that the Marshall equipment may be more error prone, but errors are more recoverable than those that turn up in the 2314. He added that he has no measurement of the performance of the two systems but believes that over a like period of time, the Marshall equipment might be better than the 2314.

University Microfilm, a division of Xerox in Ann Arbor, Mich., also uses Marshall equipment.

(Continued on Page 4)



### Environment Control

A process control system to monitor and control all of the environment of a typical department store was unveiled at the 61st Annual Convention of the National Retail Merchants Association. The system, based on an IBM System 7, controls all the functions of a store including turning on and shutting off the electricity. It also monitors fire detection and security control sensors. (Story on Page 3)

### \$10 Million System

### Mass. Readies DP Welfare Plan

By Edward J. Bride  
Of the CW Staff

BOSTON—It's back to the drawing board for the Massachusetts Welfare Department computer system, but local observers are optimistic that a new \$10 million, two-year plan can work. Development of the department's computer system has been fraught with errors, delays and cost overruns in the four years since the state took over the welfare function from municipalities.

The computer system is the recommendation of a new internal study which proposes spending \$7.8 million to develop a centralized financial management

control system and to lease still-unselected hardware.

While the report also suggests that annual maintenance of the system would cost \$3.8 million, Welfare Department employees reported that adequate provisions for overruns were taken.

Besides offering better service to the 60,000 families on relief, the new system should prevent recurrence of the injustices of recent years, when 3,000 ineligible families were given welfare benefits while about the same number of eligible families were denied these benefits.

A recent report claimed errors were being made in 40% of the state's welfare cases, either in

The techniques utilized by Release 27 take advantage of 370 hardware and prevent its use on 360, the company said.

Thus the long-anticipated move by IBM to withdraw its support for DOS/360 is finally under way and users apparently have

some 14 months in which to decide how they will cope with the new situation.

The time frame may be a mirage, however, since IBM has said that "the possibility does exist" that individual components of Release 26 may be reclassified from Class A to Class C support prior to March 1973.

Some DOS/360 users have

### Bell Rejects FCC Request On Tariffs

By Ronald A. Frank  
Of the CW Staff

WASHINGTON, D.C.—Direct FCC intervention in AT&T's interconnection policies came one step closer last week when the phone company rejected a commission request to modify its tariff requirements.

The Independent Data Communications Manufacturers Association has told the FCC that Bell's interconnection policies are discriminatory (CW, Dec. 22). Based on this and related data, the commission staff asked the carrier to change its present policies.

The carrier refused to comply on the grounds that the FCC request would place "undue emphasis on the need to promote competition for the benefit of a few suppliers."

'Controlled Environment'

In a letter to the commission, AT&T said that it favored "a controlled environment in which customer-provided equipment (can be connected) without undue jeopardy to the services of other users."

(Continued on Page 4)

adopted a wait-and-see attitude about the loss of support for their operating systems, but one, George Bellas of Col-Cruchie, Syracuse, N.Y., sees the handwriting on the wall. "IBM is saying to the medium-sized user, 'you have to go to OS, and acquire more core and a larger installation,' or, putting it another way, IBM is saying, 'hey, spend some money,'" Bellas said.

Independent Vendors

Users may be able to gain functional enhancements for continued DOS/360 operation through independent software vendors. A spokesman for one such firm, which markets a highly successful enhancement to DOS, noted his company has tried to fill in wherever IBM has left a hole in its software. He sees no reason why his company should change that policy in the light of IBM's DOS policy.

Some components of DOS had already been downgraded to Class C before Release 26 became available. The announcement of reclassification of other

(Continued on Page 3)

### On the Inside

NRMA Puts On Show For Retail Users

— Page 3

Special Report: Prospects Of Future Data Carriers

— Page 8

Communications Will Pace DP Industry Growth

— Page 25

Communications . . . . . 12

Computer Industry . . . . . 25

Editorial . . . . . 19

Financial . . . . . 26

Software/Services . . . . . 13

Systems/Peripherals . . . . . 19

(Continued on Page 4)

## Developing Nations — Part III

## First Priority: Education, Training for Applications

By E. Drake Lundell Jr.

Of the CW staff

NEW YORK — There are several ways that the United Nations, countries and even individual companies or organizations can help promote the use of computers in developing nations.

The recommendations and conclusions of a recent U.N. survey of the use of computers in developing countries outline the various forms which international action may take to intensify cooperation in the computer field and the role the U.N. can play in promoting that cooperation, especially in the area of the transfer of technology and the training of personnel.

"Education and training for the application of computers to accelerate the process of economic and social development must receive first priority," is the major conclusion drawn by the study.

To meet this need, the study urges the establishment of both national and regional centers to train personnel for the computer field.

Means should be found, the report says, for creating materials and developing techniques for teaching the effective use of computers and efforts in this area should be supported by the world body and its agencies.

The report notes the problem of training people overseas, i.e., often they never return to their homeland, and urges the development of courses and educational material that can be used in the country embarking on a computer program.

The second major conclusion of the study is that "each developing country needs a broad national policy, consistent with its national goals, on the application of computer technology."

It urges developing countries to formulate plans containing realistic goals, listed in order of priority, so that orderly short-term and long-term development may take place.

It also urges each developing nation to allocate sufficient resources to implement its master plan for computer use.

The third major conclusion is that "international cooperation needs to be increased in activities relating to the application of computer technology to development."

In this line, the report states that "the Secretary-General believes that the General Assembly may wish to consider... the establishment of an international advisory board on the application of computer technology for development," which would report annually to the U.N.

In addition, the report recommends that "organizations and institutions in developed countries be encouraged to establish 'twinning' relationships with organizations in the developing countries and that U.N. programs support such action."

Under a "twinned" arrangement, the organization in the developed country would offer its advice and help to the organization in the developing nation in implementing computer-based projects.

The report also recommends that the U.N. call more fully on the international professional organizations for their technical assistance.

The final conclusion of the report states: "Computer technology will increase in importance in the developing countries during the Second United Nations Development Decade and its diffusion and sound application can make a significant contribution in accelerating the rate of their economic and social development."

Therefore, the report says it "is important that in the developing countries:

- "The analysis and systematization that occur when computerization takes place be recognized in itself as a most significant contribution to improving management, decision-making and resource allocation.

- "Trade barriers including customs regulations impeding the international movement of equipment, magnetic tapes and cards be minimized.

- "Exchange of software and data under appropriate conditions of protection be facilitated and encouraged."

This is the final part of a survey of the role that computers can play in aiding developing nations, and the U.N.'s plans for speeding their application.

# "COMPUTER PRINTOUT WAS COSTING US A FORTUNE."

(G. E. Richards, Manager, Data Center, The Goodyear Tire &amp; Rubber Company)



## Kodak COM system saved Goodyear \$250,000 on forms alone.

At The Goodyear Tire & Rubber Company's data processing center in Akron, Ohio, nine computers turn out vast quantities of data for their worldwide operations.

To help distribute and utilize this data faster, Goodyear installed a Kodak KOM-50 microfilm, which converts computer tape data directly to microfilm... at incredible speed. This eliminated the need for 132 printed forms—enough to pay for the company's entire microfilm system.

And Goodyear also reports substantial savings in file space and improvements in file integrity and information retrieval.

How much can a Kodak COM system save you? Fill in the coupon and we'll help you find out.

Please send me full details on Kodak KOM microfilmers and their applications.

Name \_\_\_\_\_ Position \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Eastman Kodak Company  
Business Systems Markets Division  
Department DP504, Rochester, N.Y. 14650

For better information management

**Kodak Microfilm Systems**



## Call to the Top Proves the Cure

By a CW Staff Writer

COLUMBUS, Ohio — Having problems with IBM equipment? Try telephoning the company's chairman of the board, T.V. Learson.

C. Donald Curry, Ohio Registrar of Motor Vehicles, did, and it worked.

The Ohio Bureau of Motor Vehicles had received its new 370/155 to replace a 360/50 as the heart of its state law enforcement system — a move carefully coordinated with the Department of Finance, since its 370 serves as backup — but could not get it operating.

"We had a lot of downtime," Terry Massaro, the bureau's data conversion manager, stated. "It was a result of power problems, among other things."

The downtime meant the bureau was falling further and further behind in updating its traffic conviction and driver license records. Massaro said that working with the IBM sales and service staff did not solve the bureau's problem. Curry explained that he got on the telephone and talked with a lot of people, finally talking with Learson himself. "I told him I was a farm boy from Licking County and that for years I drove one of one those old, old-time cars that didn't work right, and I couldn't get anything done about it, so I've been driving cars of another make ever since."

Curry added that he asked Learson if he knew what he meant. He said Learson assured him he did.

Massaro said that he could not be certain if the bureau's problem would have been solved anyway, but after the telephone call, five customer engineers were assigned to the project, and a sixth IBM employee coordinated their efforts. "The system was up in three days," he said.

# It Was All DP for the Retail User at NRMA Show

By E. Drake Lundell Jr.  
Of the CW Staff

**NEW YORK**—Computer systems designed for specific user needs were featured here last week at a host of computer firms displayed point-of-sale (POS), credit authorization and environmental control systems at the National Merchants Association's (NRMA) 61st Annual Convention.

"Several years ago there were almost no computer systems designed for the retail industry, even though we are potentially one of the largest groups of computer users in the country," according to one attendee.

"But now all of that has changed," he added.

And from the evidence at the show, it has changed with a vengeance—with almost 30 exhibitors showing computer-based systems designed specifically for the retail user.

One of the most innovative systems on display was a complete environmental and security control system for retail stores based around a System 7 shown by IBM. The primary problem in designing meaningful retail systems "is the difficulty in communication between the merchant and the computer expert," according to Robert D. Villency, president of Maurice Villency, Inc.

"Even the most astute merchant can have difficulty in verbalizing what his needs really are, and conversely, even the most expert EDP man has difficulty in recognizing the merchant's real needs," he said.

"To further complicate the problem, the right information improperly organized largely dilutes the effectiveness of your system," he added.

The new products in the point-of-sale area were displayed by the Uni-Tote Division of General Instrument Corp. and Pit-

ney Bowes, but displays of equipment were made by almost all companies in the business including The Singer Co.'s Business Machines Division, NCR, Olivetti, Registration Systems, Ricca Data System, TMD Corp. and Transaction Systems Inc.

The Uni-Tote system combines the firm's Model 300 POS terminal with a new minicomputer, the General Instrument System 75, into a total system.

The System 75, which can have a cycle time of .1200 or 800 nsec and a core size from 8K to 64K bytes, can be interfaced directly with IBM 360s or 370s or any IBM-compatible mainframes, Harold Rapaport, senior vice-president of General Instrument, said.

The System 75 would be used as a store controller in a typical application, he said. It could be connected to several dozen to several hundred POS terminals in the store and also connected to the retail chain's central computer at some other site.

The four new products from Pitney Bowes were included in its display, which also included the firm's Spice electronic register systems.

The products, which will be marketed by Monarch Marketing Systems, a subsidiary, are the automatic tag encoder-imprinter, Model 1920, which operates from computer-produced tab cards; an automatic tag reader, Model 2310, for backroom batch reading; the Model 1804 tag Pin-On machine, and the MDR (Monarch Data Recorder) 2100 System for order entry and data reporting from multiple locations.

In addition to the new POS systems, there were several new credit authorization systems unveiled at the show.

Two new electronic credit authorization and check cashing control systems—a software-based computer-operated Credit-Check system for larger department stores and the Orom (Optical Read Only Memory) system for smaller depart-

ment stores, specialty stores, discount stores, and supermarkets—were introduced by Credit Systems, Inc.

The heart of the Credit-Check system is the Model 1600 mini with a direct access memory channel that transfers 833,333 words/sec into its core memory. This allows the CPU to supervise 22,000 terminal unit and authorize transactions per hour while maintaining a comprehensive data base for each account in disk files. Orom is designed for stores with one to 32 cashier stations, or more, and requires no outside communication lines. A low-cost in-store ROM processing unit containing a 14-in. acetate disk holding up to 30,000 negative 16-character records is accessed electronically from point-of-sale terminals at cashier counters.

TRW, Inc., which last month in Los Angeles inaugurated "Validate," a service for immediate on-line approval of non-cash transactions, announced that it will offer the same service in New York.

# The Librarian. It saves time. And money. The way we've never done it before.

## DOS/360 Support

To End March 31, 1973

(Continued from Page 1)

elements was contained in the cover letter that went out with Release 26. Further reclassifications will "undoubtedly" be announced six months prior to the effective date of change "in the normal way," IBM said.

### April Reclassification

The Release 26 transmittal told users that Group 1, 2 and 3 utilities would be reclassified as of mid-April, and Cobol D would drop to Class C status as of June 15, 1972. That is similar to the pattern IBM followed, under OS/360, of withdrawing support for non-standard Cobol at least a year after the availability of an ANS compiler.

Once components are reclassified, normal development under Centralized Programming Services ceases and no more releases are issued. User or field off-infound bug may be submitted through the Authorized Program Analysis Report (APAR) procedure, up until the date of the reclassification, however, and if accepted, will be processed by IBM until a solution is forthcoming, the company said.

DOS Release 26 is described by IBM as a "functional stabilization" of DOS for the 360 user. Essentially a maintenance release, it will gain support for some new devices in May 1972. The new components, which will become part of DOS Release 27 at the same time, will support the 3270 Display System, 3735 Programmable Buffered Terminal and the 2596 Card Read/Punch device.

DOS Release 27 will include support for the 3330 disk storage subsystem, and logic for the enhanced repertoire of instructions available on the 370. There are the components of the release which make it inoperable on the 360, IBM explained.

An effective source program retrieval and maintenance system.

### The Librarian.

Can save a programmer time in the clerical and mechanical tasks necessary for program maintenance. A simple set of commands controls all maintenance activity including updating, reorganizing, documenting and debugging.

### The Librarian.

Can save money by cutting down machine time. All source modules are stored on disk or tape... not slow reading cards.

### The Librarian.

It might even save your company by protecting one of your most important assets... your programs. The Librarian makes on auditor's job simpler and provides the necessary project control for a clean, secure system. One not likely to be sabotaged. One not likely to be tampered with. And there are no cards so there's no danger of shuffling, tearing, or dropping.

A master file contains relevant information pertaining to the status of all programs and a listing of all action taken. A master file index provides quick access to the contents of the master file.

An Update Record lists all operations performed in the

current run. A Summary of Activity lets you know how modules are affected and cites any errors found. A permanent record of all activities for any source program is stored-most tapes for easy retrieval.

Call your nearest ADR office for a quick and simple presentation of how the Librarian can work in your system. Everyone can stand to save time and money. No one can afford to lose their programs or their company. For any reason.

Or use this coupon:

Applied Data Research, Inc.	
Route 206 Center	
Princeton, N.J. 08540	
Please send me more information on Librarian.	
I'd like to see a presentation of Librarian. Please call me for an appointment.	
NAME _____	
TITLE _____	
COMPANY _____	
ADDRESS _____	
CITY _____	STATE _____ ZIP _____
TELEPHONE _____	

**APPLIED DATA RESEARCH**  
THE SOFTWARE BUILDERS  
DEVELOPERS OF APPLIED LIBRARIAN, ADR-1, ADR-2, ADR-3, ADR-4, ADR-5, ADR-6, ADR-7, ADR-8, ADR-9, ADR-10, ADR-11, ADR-12, ADR-13, ADR-14, ADR-15, ADR-16, ADR-17, ADR-18, ADR-19, ADR-20, ADR-21, ADR-22, ADR-23, ADR-24, ADR-25, ADR-26, ADR-27, ADR-28, ADR-29, ADR-30, ADR-31, ADR-32, ADR-33, ADR-34, ADR-35, ADR-36, ADR-37, ADR-38, ADR-39, ADR-40, ADR-41, ADR-42, ADR-43, ADR-44, ADR-45, ADR-46, ADR-47, ADR-48, ADR-49, ADR-50, ADR-51, ADR-52, ADR-53, ADR-54, ADR-55, ADR-56, ADR-57, ADR-58, ADR-59, ADR-60, ADR-61, ADR-62, ADR-63, ADR-64, ADR-65, ADR-66, ADR-67, ADR-68, ADR-69, ADR-70, ADR-71, ADR-72, ADR-73, ADR-74, ADR-75, ADR-76, ADR-77, ADR-78, ADR-79, ADR-80, ADR-81, ADR-82, ADR-83, ADR-84, ADR-85, ADR-86, ADR-87, ADR-88, ADR-89, ADR-90, ADR-91, ADR-92, ADR-93, ADR-94, ADR-95, ADR-96, ADR-97, ADR-98, ADR-99, ADR-100

**NEW FEATURE: COBOL SYNTAX CHECKER** A syntax checker has recently been added to the Librarian to enable a user to readily check the syntax of COBOL source programs as it is being updated. The checker will increase programmer efficiency and accuracy, as well as save COBOL compile time.

Call your nearest ADR office:

Atlanta 404-233-3097/Boston 617-246-0167/Chicago 312-692-7153/Cleveland 216-331-1658/Dallas 214-638-3890/Detroit 313-212-6999/Hartford 203-643-1597/Houston 713-526-3188/Kansas City 816-753-5372/Los Angeles 213-826-5527/London 212-696-4050/Pittsburgh 412-391-3439/Rochester 716-422-0420/San Francisco 415-981-4740/San Juan 809-725-0264/Sao Paulo 206-682-3244/St. Louis 314-982-2120/Washington 703-524-9880/Foreign Cities: Amsterdam 020-76-38-98/Basel 01-54-70/Copenhagen 01-31-90-63/Düsseldorf 021-33-34-71/Geneva 01-22-43-93-60/Johannesburg 42-8212/Brussels 11-94-70/Milano 06-08-07/Oslo 01-51-79-Paris 533-57-20/Stockholm 08-61-1/Tokyo 742-1291/Toronto 416-362-7681.

Applied Data Research, Inc./Route 206 Center/Princeton, New Jersey 08540/Telephone: 609-921-8550

# Centralization May Cure Welfare ills

(Continued from Page 1)

His report was compiled partly as a reaction to an independent legislative study last summer [CW, June 23], and to a "list of critics," he related, including at least two computer-related firms which had "assisted" in developing a still non-existent welfare computer system.

Among the critics were three unemployed DP consultants, who performed the 1971 study. They recommended formation of the PMO, and suggested new staffing and new approaches to administering the Welfare Department's computer.

House Speaker David M. Bartley said last summer: "We cannot hope to bring controlling the cost of welfare, if we are unable to control the data used in the functioning of the program."

The new staffing could consist of internal employees, outside consultants, or a combination, Eichman noted, but one requirement will be that PMO retain control over development of the system, he stressed.

One of Bartley's aides said last week that the department now "has to go back to the drawing board," set hardware and software specifications, and go out for bids. While other states have portions of welfare systems operating (such as paying Medicare/Medicaid bills), this is an

overall approach being proposed.

"This is the beginning," he said, adding he is "confident" that the concepts are workable. The report, which was not made available to the public, lists certain "recommendations" to measure progress, Eichman added.

"Besides giving better service, we will have the tighter controls necessary," he continued.

The state legislature is currently examining the study, and

state officials will try to convince the Federal Government that implementation will be worth the federal contribution of 50%.

The department's computer center still consists only of an IBM 360/40, which is "inadequate," Eichman said. While no specific hardware is mentioned in his report, Eichman suggested the new equipment might be along the caliber of a 370/145, or perhaps two 145's.

## These Disk Users Happy

(Continued from Page 1)

Arbor, Mich., evaluated Potter's entry against the 2314 and found it to be faster. The Second National Bank of New Haven, Conn., a Memorex user, found that supplier's entry to have faster read/write and access times than the 2314. The Aluminum Co. of Canada, Ltd., which has experience with the 2314, reported that its Ampex units became operational more quickly, a statement echoed by Walls, assistant director of the computer center at Texas A and M, another Ampex user. McMath said that the school's first units were delivered on a Friday and were operational on a Monday.

Western Geophysical Co. of Houston, Texas, mixes Calcomp plots with 2314s and reports no problems. Manion pointed out that Marshall's plug-pointed switchability was one of his firm's primary considerations in selecting Marshall equipment.

No users reported any significant problems. Some said there were incidents when the equipment was first installed but considered it normal. In other instances, the problems were due to disk replacement.

Manion at Torrington described a few initial problems but added that only one incident has been experienced over the past 10 months. He said that his staff was able to debug four drives a few weeks after installation.

Joseph Berwey, operations supervisor at University Microfilm, reported that his firm's Potter equipment was operational in two days.

J. W. Smith, director of information services at the Massachusetts Mutual Life Insurance Co.

in Springfield, a user of Telex units as substitutes for the newer 2330 disk system, reported no problems with the Telex equipment but added that the equipment has been operational less than a month.

All independent disk system users were very careful to study the service offered and compare it to that offered by IBM before reaching a decision. Joseph Scignano, systems and programming officer at the Second National Bank, said that service was the major consideration that had to be resolved before selecting Memorex. "The service is great," he declared.

Robert Marden, assistant vice president of operations at the Putnam Fund Distributors in Boston, pointed out that Memorex's service exceeded that offered by IBM. "Memorex will 'babysit' if necessary, but not IBM," he explained.

Besides price that influenced the decision to go with independent disk supplier? Massachusetts Mutual had good luck with Telex's single density disk units. Joseph Berwey at University Microfilm had good experience with Calcomp plotters. Optimum Systems, a service operation in Palo Alto, Calif., chose Memorex because it believed it had the best reputation. Aluminum Co. of Canada was impressed with Ampex's core memory units.

Texas A and M was also influenced in its selection of Ampex due to experience with the core memory units, as McMath explained, use of the memory units required that an Ampex service man be on call. "In servicing the Ampex disk units cost the school no more."

All those surveyed said they would recommend the equipment they were using to others.

## Bell Defies FCC on Tariff Change

(Continued from Page 1)

The FCC had asked AT&T to allow direct connection of certain dial and answering devices provided by non-Bell suppliers [CW, Dec. 29-Jan. 5], pending further study.

Current tariffs require that user-supplied equipment must be connected to the telephone network through an interconnection device. However, if the same equipment, supplied by the manufacturer, is rented from the telephone company, no interconnection device is required.

But the carrier said that the FCC staff's request was "an unwarranted shortcut and appears to be inconsistent with the work" of the PBX Advisory Committee. The PBX group is

working to establish standards for equipment certification.

An FCC staff spokesman said that the Common Carrier Bureau has "gone about as far as it can" with the issue. "It is now up to the commission to take action," he said.

The AT&T reply was called non-responsive by the staff spokesman. The FCC letter had asked for a definition of work performance standards used by Bell to determine when harm is done to the phone network, the source said. "But in reply they gave us quality of performance standards instead. If they have no network protocols to be inconsistent with the work performance standards, we need," the FCC spokesman said.

## News Wrapup

### WU Settles Customer Lawsuits

NEW YORK — A computer service bureau has had a breach of contract judgment vacated, and will pay its former customer a total of \$1.795 million of the \$58 million being sought in various lawsuits.

The plaintiff, Law Research Service Inc. (LRS), had been a customer of the computer service operation of Western Union Telegraph Co. (WU). LRS complained that WU was not promptly lodging new legal cases to the data base of law precedent, to be used by lawyers in legal research.

LRS won that case, and was awarded \$11 million in damages by the New York State Supreme Court [CW, April 7, 1971]. The two parties have now agreed to settle additional cases out of court, for \$1.795 million. LRS is currently in Chapter 11 of bankruptcy proceedings, so both the court and LRS creditors must approve the plan.

### Computer Adds 73d Homicide to Record

DAYTON, Ohio — A computer operated by this city's police department, which its operators and uncovered a murder.

The system uncovered a homicide not counted by detectives and disagreed with the announced total of 72, a one-year record. The discrepancy came to light when a monthly report of criminal activity showed 67 homicides for the year. The homicide squad carried a figure of 66 for the same period.

A count of homicides showed the computer was right, and updated figures were prepared.

### GOP Builds Up Debt for DP Redistricting

LANSING, Mich. — Republicans in this state are out drumming up money to finish paying for computer work on drawing legislative and congressional districts.

The computers are being used to draw new legislative and congressional districts as required by the Constitution.

To keep the computers working, the state headquarters came up with some \$7,000 to go with the \$10,000 from the Republican

Committee. This has resulted in census and political data being fed into the computers.

### Bills May Crack Down on Faulty Ticketing

ALBANY, N.Y. — Legislation may be forthcoming to rectify the "quixotic behavior" of the city's Parking Violations Bureau whose computer has been billing erroneously for parking tickets.

Sen. John D. Gensmer (R-Alb.) has introduced bills which would give the right of the recipient of a summons to an appeal in person before an examiner. The bureau has been sending summonses to innocent drivers, to out-of-city residents who weren't in the city at the time of the violation and even to non-owners of the vehicle. A "ticket" would be "deemed" issued if the bureau didn't answer a "reasonable inquiry" sent by registered mail within 30 days.

### Traffic Control Plan Gets Vote of Confidence

CHARLOTTE, S.C. — A recently completed rush hour study of this city's computerized traffic control system revealed that it has reduced travel time in the downtown area by 17.4% — as much as 50% on some main thoroughfares — and has resulted in an overall cost saving to motorists of \$261,804 or \$2 per vehicle.

The dollar values on the savings were derived from figures supplied by the Texas Transportation Institute from a study it completed recently for the U.S. Department of Transportation. According to Harold M. Raynor, the city's traffic director, with the institute's figures it was determined that it cost \$2.70 per hour per person to operate a motor vehicle in the city. Each second a motorist is delayed costs him 8 cents.

Average driving speed in the downtown area has gone up from 21.8 miles an hour to 24.3 miles an hour, Raynor said.

The study was a follow-up to one conducted before the computerized system was installed. It also revealed that there were 47.5% fewer stops for traffic signals and 48.5% less delay time.

A total of 130,575 vehicles used the system in the first year. The cost was \$4.21 per vehicle.

### Building on Schedule, Thanks to Computer

PITTSBURGH — Everything was on schedule in the building of the 172-room Marriott Inn until the riggers got "deer fever" and took to the woods for a couple of days last fall.

Nevertheless work has been progressing and the computer now predicts the Inn can open 10 days ahead of schedule. The computer schedules everything from the pouring of concrete to pinpointing of the opening date and has been reprogrammed to print out the off-duty pastimes of construction workers as well.

The computer has cut the completion date from Dec. 8, 1972, to the Nov. 6 opening. Before the computer was used the opening date was expected to be Jan. 22, 1973.

### 'Fald, Spindle, Mutillate...and Hug'

CHAGRIN FALLS, Ohio — Damaged input is no problem for Bob Ultman's "Computer." He advertises for his fuel oil and gasoline business, "Fald, spindle or mutilate our fuel. Our computer (my wife) doesn't care as long as you pay it."

## COMPUTERWORLD

The McGraw-Hill Companies

ROBERT M. PATTERSON, executive editor; J. A. PARKER, news editor; RONALD A. GRAKE, LUNDELL JR., computer industry editor; DONALD LEVITT, finance editor; EDWARD BRICE, JUDITH KRAMER, FRANK PASTA, JAMES UPTON, staff writers; MARVIN ARONSON, LESLIE FLANAGAN, copy editors.

J. H. BONNETT, European bureau; NEAL WILDER, national sales manager; GORDON TRAVIS, sales administrator; FRANCES BLACKLER, market research.

LEETE GDDY, production manager; HENRY FLINO, production supervisor; MARSHA BRENNER, advertising copy coordinator.

EDITORIAL OFFICES: 707 Washington St., Newton, Mass. 02160 (617) 552-4466; TWX 710-333-6430; Europe: Computerworld, c/o IPC Europe Ltd., 50 Gays Lane, London, W.C.1, England (01-242-9508).

Second-class postage paid at Chicago, Ill. Published weekly (except a single combined issue for the last two weeks in December and first week in January) by Computerworld, Inc., a subsidiary of The McGraw-Hill Companies, Inc. Postmaster: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, Mass. 02160.

Reproduction of material appearing in Computerworld is strictly forbidden without written permission. All requests to publication manager, 25 cents a copy, 50 cents in U.S.; 10 cents a year in Canada; \$15 a year. Other foreign rates on request. MARGARET PHELPS, circulation manager. Four weeks' notice required for change of address. Address change correspondence to circulation manager, Computerworld, 797 Washington St., Newton, Mass. 02160.

W. WALTER BDOV, publication manager; PATRICK MCGRAW-HILL, publisher.

IPA AIA

POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, Mass. 02160.

## Epoch 4's best salesman.



**It's the 2420.**

New, high-speed hardware has made the computer tape business a whole new ball game.

In fact, some conventional tapes are having a tough time keeping up with the new drives. They're supposed to. But they don't.

Epoch 4 does.

As a result, the 2420 sells a lot of Epoch 4 for us.

But, even if you don't have 2420's, you still need Epoch 4. For two good reasons.

First, Epoch 4 is the best tape you can use, right now, on any transport. Because its coefficient of head wear is less than four per cent of the industry average.

Its modulus of toughness is 80 times greater. And it's the only tape in the business with a twenty-year warranty.

Second, there's the future. Sooner or later, you're going to upgrade to faster transports. 2420's, or something even faster.

Chances are, conventional tape won't perform properly on the new high-speed drives.

So, if you're buying anything less than Epoch 4 right now, your investment may soon be obsolete.

Think it over. Then try Epoch 4. It'll turn your transport into a super salesman.



**GRAHAM  
MAGNETICS**

Graham, Texas 78048

# **ITEL**

## **presents the expanding solution to computer system costs.**

The expanding solution lies in ITEL's expanding capabilities. We started by offering you the best price/performance lease on the IBM System/360. Your benefits grew as we acquired our disk drive manufacturing capability, Information Storage Systems, developed marketing agreements with Advanced Memory Systems and added System/370 leasing to your options.

Fully committed to the Data Processing Industry, as demonstrated by this ever-expanding line of services, we now offer modern managers the best price performers in the industry, including System 360 or 370 Central Processing Units and the new ITEL 7330 disk subsystem and Monolithic Main Memory, plus the most favorable money savings in the business. And—highly important—the room to improve and expand as better techniques develop.

ITEL can supplant IBM arrangements or upgrade the whole operation, and leave you with substantial annual savings. That is because our financial people are data-processing professionals. Like you, they know that your problem is unique and you know your business best. So, every ITEL solution is tailored to the condition at hand.

A big part of your benefit is that the products we manufacture—an ever expanding line—are at the forefront of technological advancement.

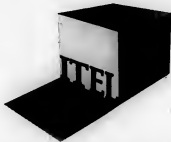
For instance, ITEL's Monolithic Main Memory Extensions, available for both the IBM/360 and 370, are of fourth-generation technology at significant cost savings over IBM prices. (This exceptional add-on is manufactured to our specifications by Advanced Memory Systems, Inc., Sunnyvale California.)

Similarly, the ITEL 7330 disk drive subsystem is plug-to-plug compatible with IBM's 3330 on all IBM System/370's and is actually a whole new level of high-density disk capability, in terms of both speed and capacity. Built by ITEL/Information Storage Systems, it uses standard 3336 disk packs and has 800-million-byte capacity per subsystem.

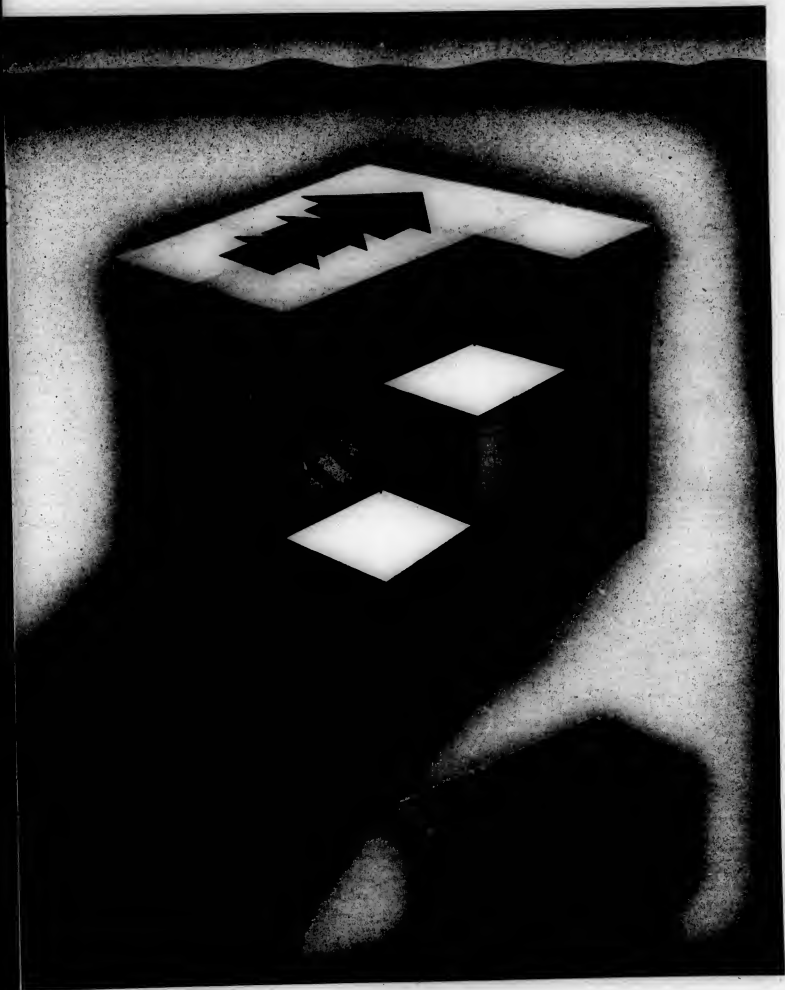
But what about service? ITEL has it. Economically, from a nationwide, on-call staff. A trained, qualified organization, skilled in servicing everything from IBM mainframes to add-on memories, disk drives, and other peripherals.

It comes down to this: ITEL gives you the in-depth experience of data processing and financial professionals. Strong technical capabilities and proven superior products. Follow-on service that means you needn't worry about service. When you are considering any data processing change—new installation, upgrading, or cost change—get in touch with ITEL.

ITEL's people and ITEL's products will show you our expanding solution to today's computer system costs.



ITEL Corporation, DPG, One Embarcadero Center  
San Francisco, California 94111, Phone: (415) 989-4320



## • Too Many Systems? How Will Bell React?

# Those Great Expectations Of the Future Data Carrier

By Ronald A. Frank

After Microwave Communications Inc. (MCI) broke new ground with its initial Chicago-to-St. Louis proposal before the FCC, other potential specialized carriers decided the concept had merit.

Although there are currently about 1,960 specialized carrier applications pending before the FCC, this figure is misleading. Each individual tower site in a microwave system is classified as a separate application by the commission. Consequently, a large number of tower applications will make up one system filing.



Each future Datran subscriber would use the Digital Communications Console.

For example, the first route now being operated by MCI includes 11 individual sites or applications.

Among the 1,960 applications, there are only 14 separate firms which plan regional or national specialized carrier networks. Some of the largest networks include separate links for individual routes. The proposed MCI coast-to-coast system includes 19 separate regional routes, all of which will be interconnected much like the individual operating companies of the Bell System.

### Year to Complete

Even with approval in 1972, most microwave links will require at least nine months to a year to complete construction and testing and begin service to users. Some of the applicants with existing private networks already in operation may be able to reduce this lead time. Datran, which plans to construct its entire system before providing services to users, estimates it will need several years to build its network. Significantly, AT&T plans to begin service on its all-digital network in early 1974. This date coincides with present Datran plans to inaugurate service. Some of the specialized carrier applicants are already providing non-data services. One of the largest microwave systems now in operation belongs to Western Telecommunications Inc. (WTI), which operates about 13,000 route miles in the West and Midwest through 16 states.

Most of the WTI system is used for non-digital services such as television transmissions, but data services are in the forefront of the specialized carrier offerings being planned. In addition to high-speed CPU-to-CPU channels at 50 Kbit rates, WTI is also considering store-and-forward operations with high traffic processors installed at key traffic centers.

### New Link

The company is currently completing a new link in the Oregon-Washington area that will have a two-way transmission capability to handle digital traffic. WTI is expected to use this new link as a proving ground for its digital services in anticipation of FCC approval for its specialized carrier applications.

With its buildings, antennas and towers already in place along much of its proposed specialized carrier routes, WTI ex-

pects to cut its construction costs and time compared to some of its competitors. "It's simply a matter of installing additional microwave transmitters and some more antennas," according to Doug Johnson, director of WTI's commercial department.

WTI has filed a proposed data tariff that includes more than 90 digital service offerings, Johnson said. Several other specialized carriers have modeled their services after the WTI proposal, he said. The company expects to receive FCC approval with first services to users beginning before the end of the year.

One specialized carrier applicant, Southern Pacific Communications Co., is an outgrowth of the large Southern Pacific railroad communications system that has been in operation since 1961. The road already has more than 6,000 miles of microwave circuits in operation.

Southern Pacific will use existing microwave towers to install its specialized carrier equipment, according to John Albertson of the engineering staff. "We will supply services at rates 5% lower than others because of our existing experience," Albertson told CW.

### Switched Network

The largest single applicant is the Data Transmission Co. (Datran) and it proposes to build a switched national network, similar to the existing phone system, that will bill users on a timed basis. The Datran

## Local Loop Connection Problems Can Be Solved

With the possibility of many specialized carriers dotting the landscape, the question of internetwork compatibility has been raised by some users.

A subscriber of a data network that ends abruptly at a state border will want some assurance that another carrier will be available on the other side to pick up his signals and carry them further.

### Minimal Problem

With point-to-point microwave systems such as MCI, Western Telecommunications and most of the others, this compatibility problem will be minimal. Effectively a three KHz channel on one system will be virtually identical from one microwave system to the next. And most of the specialized carrier applicants claim they are ready to interconnect with other systems when the time comes.

For the data user the risk appears small. If for some reason his specialized carrier cannot bring his signals to some out-of-the-way remote site, he will probably be able to switch to the telephone system for a portion of his network, where necessary.

Datran users might have more of a problem in this regard because they will be using a switched service which is not directly compatible with other carriers. But Datran spokesmen have said that their system will be interfaced with any long haul transmission systems that offer economy and don't jeopardize the reliability of the Datran operation. Even so, the problem in this regard becomes acute if the data user here is limited in the sites he can reach.

The technology required to interconnect local separate microwave systems is relatively simple. The data signals are transmitted from tower to tower by highly directional antennas which aim or beam their signals to the next tower. The transmission equipment and technology for

## Special Report: Communications, Part II

The new specialized common carriers may eventually revolutionize communications, but their effect on most users will be gradual. Despite the many optimistic predictions, users will not be immediately affected by the new services. Data networks take careful planning before they are set in operation. This month's special report gives users an overview of what is available, what can be expected, and the trade-offs associated with new data services.

Last week's report considered how the specialized carriers evolved, what MCI service means to the firm's first users, and the potential data uses of cable TV systems in urban areas.

system would begin service in 1974 but the FCC has yet to rule on the application.

Datran plans to switch its calls (it will handle only data) through computers installed at regional centers. While the CPU interaction would give potential subscribers special services such as the ability to reach several terminals simultaneously, the plans require extensive special software. According to estimates of the firm of Arthur D. Little, the Datran system could cost up to \$400 million for construction.

The company has already spent an estimated \$10 million in anticipation of network operation. Datran plans to build its initial network to serve 35 major metropolitan areas in about three years. Unlike MCI which is connecting regional systems into its growing network one at a time, Datran plans to throw the big switch on its 35-city network early in 1974.

Datran plans to offer switched service at data rates of 150 bit/sec, 4,800 bit/sec, 9,600 bit/sec, and 14.4 Kbit/sec. Rates will be based on six-second blocks of time called Data Units. The company plans to have both local and national rates, each

of which will be based on the amount of Data Units used by the subscriber.

In addition, Datran will provide its users with a Digital Communications Console (DCC) that will be installed as the interface between the user's site and the Datran network. The DCC will cost \$15/month and will act as a terminal unit to provide necessary signals and coordination between calls.

Since the Datran system will not have a voice capability, it will not be possible to talk to another subscriber under normal operating conditions. Data users on the Bell System who now pick up the handset on a Bell modem to set up the conditions for a data transmission will have to use the control keys of the DCC instead.

While Datran rates will be based on usage time and data speed, a "typical minimum monthly fee" will be \$40/month, according to a Datran spokesman. This figure would include two hours of "normal transmission time" and three hours of "local transmission time" plus the \$15 monthly charge for the DCC.

Is there enough room for a duplication of specialized carrier routes, in many (Continued on Page 9)

the specialized carrier's terminal.

In addition, Datran has been experimenting with optical systems using infrared and laser beams, with encouraging results. More conventional hook-ups using telephone company wires (already available at most locations) and cable facilities can be used for local loops.

But the use of analog telephone wires means that users need to install modems. Future all-digital links will eliminate modems in favor of simpler interface devices.

MCI's initial service to subscribers will utilize telephone company-provided local loops. But telephone facilities make a specialized carrier dependent on lines not entirely under their control. So the desirable goal is end-to-end service totally supplied by the specialized carrier.

### Agreements

The use of telephone company wires for local loops places some limitations on the specialized carrier that also affect the user. To obtain telephone facilities, a specialized carrier must sign an agreement with the local phone company. In many cases such agreements are not subject to approval by regulatory agencies. Since the phone company knows its lines will be used by competing carriers, these agreements often include high mileage charges which must be passed on in some form to the data user.

There are data limitations as well. In Chicago the MCI-Illinois Bell agreement limits local loop service to a 30-mile radius.

But these problems are not insurmountable and it is expected that the specialized carriers will develop their own local technology as soon as the regulatory and technological problems have been settled.

### FCC to Rule on Satellites

Next week's special report looks at the prospects of early benefits from satellite communications and the methods required to adapt such systems to the needs of the computer user. The eight applicants for satellite operations are currently awaiting an FCC decision on satellite policy expected this spring.

The report will also discuss the communications growth areas predicted for the seventies and the Bell System plan to apply special rates to specific users.

Local loop methods are being studied by all the specialized carriers. The reason is obvious. A highly reliable backbone transmission system is severely limited when a majority of subscribers cannot be easily connected to the system.

Among some of the possible local methods are short distance microwave transmitters that would send data from the roof of the subscriber's building to



"Bell...May Want to Attract Data Users With Specially Priced Dial-Up Rates." — a Consultant

## Bell Can Cut Cost or Adjust Private Line Rates

(Continued from Page 8)  
geographic areas. Undoubtedly several of the new carriers will be able to operate along the East or West Coasts without stepping on each other's toes, because the demand for service will be high enough. But in less populated areas most observers expect to see a consolidation of specialized carriers when the economic chips are finally sorted out.

Will this mean that the user of a specialized carrier might get left high and dry by a firm that didn't make it? One veteran FCC staff member sees this as a minimal risk to the subscriber. Historically, in the communications field, other carriers have absorbed the less healthy ones with a minimum of problems to the user.

More than likely there will be some consolidations before all the new carriers begin service. But the FCC said in its specialized carrier ruling that the marketplace will have to decide among the specialized carriers who survive. Most users feel that the extras promised by the new carriers are worth the economic risk.

As part of its decision to allow the entry of the new carriers, the FCC said that existing carriers operating primarily AT&T could compete as long as they didn't take unfair advantage. So while MCI is beginning to provide service, the big question for users is how will AT&T react?

With the exception of limited disruption of service from Western Union, AT&T has been virtually a monopoly supplier of communications facilities for many years. Therefore very few precedents are available to determine what the Bell System will do.

### Selective Cuts

In the area of pricing, Bell has two major options. It can either selectively cut costs on those routes where it directly competes with a specialized carrier or it can adjust its private line rates across the board.

Asked about possible Bell System competition with MCI and other specialized carriers, John D. DeBatts, AT&T board vice-chairman, said:

"If we continue to use average pricing [the new carrier] could probably underprice us. If we go to some form of route pricing that recognizes the volume on that route, there's no question that we can beat whatever price they can come up with because we can put the bill in cheaper than they can."

The AT&T veil of secrecy may have been lifted a little early in December, when the rates were filed for certain private line charges. Included was a proposed increase of 400% in private line installation charges, and lower rate hike plans for service terminal costs.

### Rearranging Rates

AT&T said that the additional \$30 million it expects to gain from the new tariff will not alter its allowable rate of return set

by the FCC at about 8%. If indeed AT&T is rearranging its rates to put an increased burden on private line users, the effects could hurt potential users of the specialized carriers.

For example, a user who interconnects his AT&T link to MCI for a portion of his total route will now have a higher extra set of installation and service termination charges to figure into his costs.

While it may seem surprising for AT&T to compete by raising its rates, some observers feel it makes a lot of sense. Since Bell has for years averaged out the costs of all its services, high cost offerings such as private line facilities have consistently been "underpriced." Therefore if AT&T gets increased revenue from its private line subscribers it will be less affected by any users who defect to the specialized carriers, these observers say. From the standpoint of today's data user, Bell's big move will come in 1974 when its new digital data network is scheduled to be ready. Some details of the new service have already been announced by AT&T.

### New Technology?

Described as a new technology from Bell Labs, AT&T plans to use its existing microwave link for new data channels. This Data Under Voice (DUV) service will utilize previously unused portions of existing channel capacity. For subscribers this could mean that the new digital service will be reasonably priced, because minimal new equipment is needed by Bell.

To provide DUV, Bell will have to install new transmission equipment, but it will be done at existing microwave sites. This means the high expense of erecting new microwave towers will be bypassed in many geographic areas. The DUV facilities will be compatible with presently installed local loops. These loops are the wire pairs from which the user connects his DP equipment to the Bell network.

The DUV facilities now planned for start-up in January 1974 are described as all-digital by AT&T. For the user this could mean the elimination of the modem or data set, required on today's lines.

### Digital Interface

But while the data set may be eliminated, a simpler interface device or translator will be needed on these all-digital facilities. Bell Labs is working on such a digital interface device, to be called a Channel Terminating

### Unit (CTU).

Presumably the CTU will be installed at each end of an all-digital link, and while it probably will be less complicated than a modem, it will still mean an added monthly cost for the Bell data user. For those who prefer non-carrier supplied equipment, Computer Transmission Corp. already has a similar unit that operates on local loops. Called the Intertran, it is priced at about \$1,900 and is probably the forerunner of the new breed of data sets.

Although the specialized carriers will have their greatest impact on Bell's private line services, one economist thinks Bell may react by providing new dial-up data offerings. "Bell will have no competition on the dial-up network. Therefore it may want to attract data users with specially priced dial-up rates," according to D.E. Winslow, a consultant who specializes in the regulatory pricing area. Other observers agree, noting that the data equivalent of a Wats line might offer real savings to high-volume communications users.

Bell will also try to hold onto its larger private line users, according to Winslow. But it may have a difficult job in this area. When the FCC first authorized private microwave networks with its "Above 890" decision in 1959, AT&T countered with tariffs that offered discounts to large users of bulk private line services.

These tariffs, known as Telapak, led AT&T into lengthy drawn-out regulatory proceedings. Ultimately the Telapak tariffs were judged to be discriminatory by the FCC and while the issue still is pending, Bell does not want another regulatory fight. It is generally agreed that Bell overreacted with its Telapak discounts for large users. Therefore AT&T can be expected to be a lot more pragmatic in countering the threat posed by the new specialized carriers.

But should AT&T worry about MCI and the other specialized carriers? Some think not. These observers point out that data users may use only a small portion of Bell's total revenues. And even if all the specialized carriers successfully offer data and other services to users, their total revenues will be only a small dent in Bell's profit picture.

If Bell decides not to compete it would allow the new carriers to concentrate on serving their subscribers without becoming embroiled in competitive marketing battles with the phone

company. But this view seems rather idealistic and Bell will probably have to react in some way. It has already given notice that it intends to file a "competitive tariff" for private line services between Chicago and St. Louis. Presumably such a tariff proposal will be designed to counter MCI's offerings on that route.

To most data users any rate comparisons between Bell and the specialized carriers are premature. But a few real users are operating on MCI's first link. One of these, Trans Union Systems Corp., is saving about 40% over the charges it used to pay AT&T for similar data facilities.

One important reason that the specialized carriers can provide cheaper (and often more reliable) service is that they have less overhead than Ma Bell. It is estimated by one former Bell engineer that it costs AT&T about \$400,000 to construct a microwave site. MCI is building the same type of facilities for

about \$150,000, and as long as the new carrier operates efficiently, users can expect the savings to be passed on in lower rates.

There are those in the Bell System who say MCI is getting its equipment from mail order discount houses which offer equipment of questionable quality. But in one recent test on the new MCI St. Louis-to-Chicago link, the reliability of the equipment was shown much better than anyone expected.

The transmission test was run by International Communications Corp., which now has its Mingo modems operating at MCI users' sites. Data was transmitted at 9,600 bit/sec for about five hours. During that time more than 300 Mbit were transmitted without an error.

In addition, "the channel itself was virtually noise free and jitter free," according to Sang Wang, vice-president of ICC. Many Bell users would welcome such reliability on their links.

### COMMUNICATIONS MANAGERS AND ENGINEERS — ARE YOU SPENDING 90% OF YOUR TIME WORKING OUT ALTERNATIVE "LEAST COST" NETWORK SOLUTIONS AND ONLY 10% OF YOUR TIME EVALUATING THESE DESIGNS AND MAKING DECISIONS?

Using the working/thinking relation using NETSET, a time-shared customer-primed network design and optimization package, NETSET provides the communications man with a powerful tool to take the "dog work" out of network design. NETSET performs a number of network analyses including DW, FDM, and WATS with any conditioning. For more information and references, call Pete Melvin at Interactive Sciences Corporation, 60 Brooks Drive, Balaire, Massachusetts (617) 340-2600. Also offices in Washington, D.C., New York, and Pittsburgh.

Lease  
for  
Less!

IBM 360/50 - I

(with 2314-1 and  
six 2401-2s)

for less than 51%  
of manufacturer's  
rental

for complete  
information, call collect  
(201) 825-1505

or write

GEM General Equity  
Management Inc.

112 Oak Dr. Upper Saddle River  
New Jersey 07085

Exclusive agent for:

epa

Computer Property Corp.

## 370 LEASING

Fantastic Savings

Flexible Terms

Also:

360/65's and 360/50's

For Sale or Lease

Write: Vole Industries Corp.,

299 Madison Ave.,

New York, N.Y. 10017

Call direct:

D. Guelin (212) 345-7330

### OBSOLETER?

Listen to a thought provoking presentation on the future of the Obsolescence in Data Processing. Through Training and Education presented December 8, 1971 at the Central Virginia College Exposition of Data Processing Series. For more information, call 810 plus \$1 handling charge or your MasterCard Account. Bank number to

INTERNATIONAL COMPUTER EDUCATION CORPORATION  
Dept. 674, Chicago Heights, Illinois, 60411. Phone orders (312) 755-8735. Illinois residents add 8.25 sales tax.

## Editorial

### Data Security, Control Must Go Hand in Hand

The FBI's "national data bank" continues to grow larger — and so does the threat to adequate security.

State officials now are attacking an FBI regulation that a computer linked to the National Criminal History System must be used only for law enforcement purposes [CW, Jan. 12].

It should be noted that this rule was not thought up on the spur of the moment. It was originally proposed by the Project Search people who did the groundwork on the system with funds supplied by the Law Enforcement Assistance Administration, U.S. Department of Justice.

The LEAA itself later made the same recommendation. State officials cite a number of reasons why they believe the rule is impractical. They note that some states require that all state computers be consolidated under a single agency. They note that a computer dedicated to the NCHS might be idle most of the time and therefore unnecessarily expensive. And they note that the easiest way of supplying the backup CPU required by an on-line system like NCHS is to have a consolidated installation.

As to security, they insist that adequate hardware and software security can be built into a shared system.

We disagree.

In the first place, we don't think any national system that can be accessed by a variety of local law enforcement and other justice agencies can be considered secure. So we are completely opposed to any attempt to decentralize control any further.

And we don't see any real need to change the rule. Large states should be able to dedicate two CPUs to justice work without hardship.

Smaller states and cities can acquire two smaller CPUs and load all their justice work on them, including court and correctional systems. If this doesn't keep the computers busy, the justice agency which operates them could get permission to do service bureau work for other government agencies while still remaining in total control.

FBI Director J. Edgar Hoover summed up the situation this way:

"If law enforcement or other criminal justice agencies are to be responsible for the confidentiality of the information in computerized systems, then they must have complete management control of the hardware and the people who use and operate the system. These information systems should be limited to the function of serving the criminal justice community at all levels of government — local, state, and federal."

We emphatically agree. The FBI already has more information on file than we think it needs, and it is making more and more of it available by remote access. Since government agencies love to collect information and DP people love to manage and disseminate information, we can assume more and more types of personal information will be added over the years to the FBI's remotely accessible files.

Therefore, every effort should be made to tighten security — not weaken it.

## Deliverance or Delusion?



## Letters to the Editor

### Charges Should Equal Value of Service

Reference is made to Alan Taylor's "Computer Bills: Should the Charges Vary With Each Job Execution?" [CW, Nov. 3].

The basic point underlying his discussion is the distinction between prices and costs. This distinction is clear in the marketplace where the customer and the vendor are at arm's length. What the customer pays for a service is the price of the service, while the cost is what the vendor has had to expend to produce the service.

From the user's point of view, the value of the same job executed at different times will be the same and therefore the price should be the same. On the other hand, from the point of view of the organization furnishing the service, the cost of the same job done at different times may be different from time to time.

It is my present opinion that the charges made should not be mere cost allocations, but instead should be charges which are equal to the value of the service rendered.

The problem with this principle is the determination of the value of service, a much more difficult task for an internal service agency than the determination of the cost of service.

Eric A. Weiss  
Consultant

Sun Oil Co.  
Philadelphia, Pa.

### Assign Resources To Find Answers

Alan Taylor's Nov. 3 report scrambles the concepts of direct costs with indirect costs and then pronounces the resulting omelot inedible.

When a production process has two or more types of output, the indirect cost associated with the production process must be arbitrarily assigned to the units of output. There is no alternative.

This argument, when applied

to a multiprogrammed computer operating in the environment Taylor described, can be translated approximately as follows: the operating system and its constituent resources are indirect costs; the same resources (plus others) when assigned to process the user's work are direct costs. How the two are separated is complex but not much different from other highly integrated production processes.

Taylor is very helpful in presenting the "Overcharging Indicators," for they can be used to test whether or not an assumed cost technique is "methodologically appropriate" or not. Taylor is helpful in raising the issue by asking, "Should the Charges Vary With Each Job Execution?"; resources clearly need to be assigned to find answers. Alan Taylor should be involved in the study so he can learn about this subject.

H.H. Hirsch, Director  
Administrative DP Center  
Purdue University  
Lafayette, Ind.

### Programs Wanted For Home Building

As a result of the many requests for information on computer programs, the National Association of Home Builders has embarked on a program to review the existing computer programs applicable to the home building/construction industry and disseminate this information to our membership.

We would appreciate hearing from companies who already have programs for feasibility analysis; single, multifamily, garden and high-rise construction; mobile home parks; and commercial and industrial developments.

Please address responses to: Richard P. Todrin  
National Assoc. of Home Builders  
1626 L Street, N.W.  
Washington, D.C. 20036

### A Key to Success?

I refer to the Dec. 15 letter from James L. Bradley, vice-

president, Management Data Services, Inc., in which he referred to a CDP's Dec. 1 letter asking what "OEM" means.

Let me just state that knowledge of the meaning of OEM is not as much an essential piece of data processing knowledge as one might think for writing a program, running a computer, or managing a DP shop, any more than vindictive letter-writing is essential to becoming a vice-president of a company (or is it?).

Terry E. Berryman, CDP  
Davenport College  
Grand Rapids, Mich.

### Avoiding the Crush

Your blurb at the end of each week's *The Taylor Report* which reads in part, "The views expressed in this column do not necessarily reflect those of *Computerworld*," is borne out by your subscription renewal practice of supplying too-big return invoices and too-small return envelopes.

However, I have used and enjoyed your publication thoroughly (from the first issue onward) and so I forced the wretched invoice and my bent-up check into the envelope, anyway, thus avoiding this crushing experience for one more year.

Mark C. Ryan  
Chicago, Ill.

When the tab with the pin feed holes is torn off, the form will fit in the envelope. However, a recent batch of forms was not properly perforated and the tab on the original can't be torn off easily. The carbon copy of these forms is properly perforated and may be returned instead of the original. Ed.

*Computerworld* welcomes comments from its readers. Preference will be given to letters of 150 words or less. *Computerworld* reserves the right to edit letters for purposes of clarity and brevity. Letters should be addressed to: Editor, *Computerworld*, 797 Washington St., Newton, Mass. 02460.

# Well Done, Grass Roots, The Breakthrough Is Yours

During the past few months I have been wading with very considerable interest in the activities of the Society of Certified Data Processors, and the grass roots opinions on professional matters that they were publishing on the Professional Viewpoint page in *Computerworld*.

These were opinions not just of society members alone but of the general data processing professional whether or not a society member, or even a CDP holder. Just professional opinions, nothing more, nothing less.

The latest arguments raised seem to deal with questions somewhat internal to the profession — such as how to avoid being given unprofessional jobs (finding excuses to sack wrong professionals), or how to avoid invading a professional's family life at the employer's request. These types of discussions are good and important. A professional cannot give of his best unless provided with an adequate professional environment. For the moment I would like to discuss some of the more important implications that have been involved in some of the earlier discussions — discussions dealing with the effects of data processing outside our profession.

These discussions have centered around just what the duties of the general professional are, and what he believes they should be. This is grass roots material and of real leadership quality — leadership that the writers of our various codes of ethics have never been able to provide.

## What the Professionals Said

What these working professionals said is so simple that it might well not be noticed. They voted strongly to defend the good name of their profession, by taking action to stop the use of "The Computer Failed" is important to protect their employers.

This is implicit. No industry, business or profession — and certainly not one developing as much as data processing still is — can afford to be known as an all-purpose scapegoat without taking vigorous countermeasures. I was glad about this response. But I was also glad the professionals did not stop there.

## Output Responsibility

They also said that the data processing manager did, in fact, have a duty to notice and protest when computer output was either inaccurate or illegal.

And that, my friends, is not just important — it is also brand new in our profession! Moreover, in at least my opinion, it is a prerequisite to becoming real professionals, and will not highly paid technicians.

## Use Bill of Rights

One of the most important implications of this acceptance of a professional duty is that it provides the use (a name that I use for the person — such as a credit card holder — whose records are maintained on a computer by some using department or firm) with some rights for the first time.

In a professional environment, the use has the right to expect that the people in the data processing operation will be real professionals — and will not ignore inaccuracies in computer output. This is good and important.

This acceptance also gives a user a general reassurance that as he sees society moving fast into a computer age, the professionals will not ignore the needs of

society to have its laws and regulations obeyed. This also is good and just as important.

In fact, so important are these implications that in celebration of this grass roots leadership being prepared to go beyond the outdated ethics codes of our tradition-bound profession, I thought it would be good to start writing a Computer User's Bill of Rights — based on the data produced by the Society of Certified Data Processors.

There is a difference, naturally between the wording of a professional opinion, and the right that comes out of it, so I will try to explain matters step by step as I go.

The voting said that a DP manager had a duty to know about inaccurate or illegal computer output. It is certainly possible and proper for a DP manager to instruct other departmental personnel to watch out for such occasions, so that in fact the duty applies not just to the overworked manager himself, but also to the rest of the profession. Therefore we can say that a user has a right to expect all DP professionals to watch for and report

*"The status of the computer professional is now seen to be tied into the rights that we give to the innocent third parties whose records we process without having them represented when we make our decisions."*

inaccurate or illegal computer output. The voting of these working professionals did not specify where the report should be made, but insofar as computer professionals are in fact professionals, the report should be made like all other professional reports — to corporate officers or their formally designated representatives.

## Bill of Rights

So, now that we have determined the content of the material, we can start developing some wordings to put the content into use.

Here are some of my first drafts: WHEREAS INACCURACIES in computer output, however caused, may hurt others, they should never be ignored by computer professionals, but shall be individually reported to the responsible corporate officer.

Then, for the case of illegal computer output, an equivalent set of words could be used, like this:

WHEREAS ILLEGAL computer output, however caused, may hurt society, actual or suspected illegalities should never be ignored by computer professionals but shall be reported to the responsible corporate officer.

That is what the grass roots professional has said should occur — and I agree with him. I like the way he has effectively given rights to the people whose records we store (and sometimes mangle). This is long overdue.

But in particular I like the fact that in giving something away the professional has actually gained something for himself. He has now described some of the aspects under which computers should be used, and he should not be used. If he has a duty to report inaccuracies, etc., then surely his employers have a duty to listen if they are to employ him professionally. So we have the start also of the Computer Professionals' Bill of Rights!

A professional, we see, has a right to have a formal reporting channel to the responsible corporate officers. Moreover, his use of such a channel should not expose him to criticism. He may, for instance, have occasion to use it privately, as for instance when inaccuracies are only possible but have not yet occurred.

And he must have a right to use it when problems have occurred, even though the problems may be financially embarrassing

## Draft for a Computer Bill of Rights

• Whereas inaccuracies in Computer Output, however caused, may hurt innocent Third Parties Such Inaccuracies Shall Never Be Ignored By Computer Professionals, But Shall Be Individually Reported To The Responsible Corporate Officer; and

• Whereas Illegal Computer Output, however caused, may Hurt Society, Such Illegalities Or Suspected Illegalities Shall Never Be Ignored By Computer Professionals, But Shall Be Individually Reported To The Responsible Corporate Officer.

Moreover, In Order That Such Inaccuracies And Illegalities Be More Expeditiously Rooted Out It Would Seem That:

• Owners & Operators Of Computers Wanting To Provide Professional Level Use Of Data Processing Must Provide Formal Reporting Channels For All Computer Professional Staff To Responsible Corporate Officers For The Reporting Of Actual Or Suspected Computer Output Inaccuracies Or Illegalities, and Shall Require That Such Channels Be Used Whenever Such Faulty Output Is Known Or Suspected; and that

• No Action, In Any Case, Shall Be Taken Against A Member Of The Computer Professional Staff Who Has Reported Actual Or Suspected Computer Output Inaccuracies To The Designated Corporate Officer, Whether Or Not Such Reports Are Later Shown To Be True; and that

• No Allegation That Computer Error Caused Any Processing Failures Anywhere In The Organization Shall Be Made Without The Allegation Itself, Its Distribution And The Supporting Evidence Having Been Supplied To The Computer Professionals Involved.

to his employer.

Action against a professional for warning about possible dangers, or actual ones, would be an illegitimate behavior as action against a state medical officer for reporting dangers to the water supply, or the outbreak of cholera.

Actually, we know that in the event of

*"The status of the computer professional is now seen to be tied into the rights that we give to the innocent third parties whose records we process without having them represented when we make our decisions."*

such occurrences there may well be pressure involved to keep the information hidden — and so it is just as important to protect the rights of people using the reporting channel, even mistakenly, as it is to have the channel there itself.

The wording I suggest for these professional rights is shown in the Draft for A Computer Bill of Rights alongside, so I

need not repeat it here.

As a next step I'd like to see our industry leadership follow this grass roots leadership. And I'd like to hear of alternative wordings, or alternative concepts that others may feel are more appropriate.

But even without this hoped-for action, one thing is certain: the status of the computer professional is now seen to be directly tied into the rights that we give to the innocent third parties whose records we process without having them represented when we make our decisions. And that was a real surprise, for me, at any rate.

© Copyright 1972 Alan Taylor. Reproduction for commercial purposes without permission. Limited numbers of copies for non-commercial purposes may be made provided they carry this copyright notice. The views expressed in this column do not necessarily reflect those of Computerworld.

## LEASING OR BUYING USED COMPUTER EQUIPMENT? WHY NOT DO BUSINESS WITH THE PRO'S?

IPS sold, in the month of December:

- 2 360/65 complete systems
- 1 360/50I
- 1 360/40
- 2 360/40 Core Units
- 2 360/30's
- 1 360/20 system
- Miscellaneous peripherals

IPS leased the following equipment in December:

- 1 360/65 system
- 1 360/40G system (3 year firm lease)
- 1 360/20 C1 system (5 year firm lease)
- 1 2314-1 (42 month firm lease)
- 3 2401-2 Tape Drives

When you have complete systems or peripherals to sell, buy or lease, deal with the people who can make things happen.

## SAVE TIME AND MONEY

Call: **Information Processing Systems, Inc.**  
467 Sylvan Avenue  
Englewood Cliffs, New Jersey 07632  
(201) 871-4200

## PROGRAMMING SYSTEMS ANALYSIS SYSTEMS DESIGN

- Highest Quality Service (Top References)
- Unreasonably Low Rates
- Satisfaction Guaranteed Or You Pay Nothing

Call Bob Lockwood  
**Systems Service Corp.**

249 W. 34th Street  
New York City, N.Y. 10001  
(212) LO-4-5852

## Communications Analysis

# Tariffs Add to DAA Confusion

By Ronald A. Frank

Or the CW staff

Data users served by independent phone companies are discovering that the need for a Data Access Arrangement (DAA) often depends on some very confusing tariffs.

With the FCC calling on AT&T to explain its current connecting arrangement policy [CW, Dec. 29-Jan. 5], data users of independent phone companies are hoping that the commission's concern will carry over to their installations.

At issue are current telephone tariffs that require the use of a DAA at sites where data sets (and other equipment) have been installed by independent suppliers. With most Bell System phone companies this requirement is relatively simple. Users either have a Bell-supplied data set, or a non-Bell supplied data set with a DAA.

But with independent phone companies the situation becomes more confusing. Many of the independents supply their subscribers with equipment

from many non-Bell suppliers. In such a case, a user might get a Sangamo Electric Co. data set installed by the Central Telephone Co. without a DAA. But if the user were to buy (or rent) the same data set directly from Sangamo, the local phone tariff would require him to have a DAA.

Asked whether the FCC was concerned with independent phone companies' DAA policies, a commission staff member said it was a "close cousin" of the AT&T interconnection policies that are currently being scrutinized by the commission.

Installations which have both carrier and non-carrier supplied equipment are called mixed sites. Some examples will illustrate how confused the situation can get.

Triangle Universities Computation Center in Research Triangle Park, North Carolina, is served by General Telephone Co. TUCC is a non-profit center which serves the DP needs of schools and universities. The center has Bell 103 modems which General Telephone installed, so they operate without DAAs. In addition TUCC has Tuck Electronics 103 type modems which are installed with Bell System DAAs that General purchased from Western Electric.

Some of the Tuck modems have been installed with DAAs supplied to General by Pulse Communications Inc. The user is happy with the Pulsecom DAAs for several reasons. First they take up about 30% less room than the Western Electric (Bell) units. More important, the Pulsecom DAAs can be mounted in varying positions and can be stacked.

The Bell DAA has mercury relays which require that the unit will be wall mounted.

Pulsecom is also reported to be developing printed circuit board versions of DAAs which can be rack-mounted with shared power supplies to save both space and costs. Under present Bell policy, AT&T operating companies may not use non-Western Electric DAAs, even when they are unable to obtain Bell units. While it is known that some innovative users have purchased DAAs from non-Bell sources, it is difficult to determine whether any of these units are operating on Bell lines. Such an installation would be a violation of present Bell tariffs.

One of the strangest DAA problems took place at a large East Coast oil company installation. The company owns Western Electric 103 data sets which it purchased some years ago through Graybar Electric. When New Jersey Bell was called in, its installers hooked up the data sets without DAAs. Shortly thereafter the phone company notified the user that the data sets would have to be re-installed with DAAs.

The user is still not sure why his Western Electric modems are operating with access arrangements. But to make the installation even more bizarre, the early 103 data sets were easily hooked directly to the telephone network, but they had to be modified to operate with the DAA units, a spokesman said.

## AT&T Proposes Cut In 201 Data Rates

WASHINGTON, D.C. — AT&T has proposed a reduction in monthly rental and one-time installation rates for its 201A and 201B data sets.

Filed with the FCC, effective Jan. 21, AT&T said it planned to decrease the charges for competitive reasons. Both the proposed decreases and the reference to competition were regarded as unusual for AT&T, according to an FCC staff source. Rates for the data sets would drop from the present \$72/mo to \$47/mo, AT&T proposed in its tariff filing. Installation charges would be reduced from \$100 to \$75, if the tariff goes into effect.

# Super Market for Disc Packs?



CFI Memories has provided packs and cartridges to the OEM market for several years, and now introduces its "Supermarket Concept" to you.

Our shelves are stocked with all types of "special" packs and cartridges, not just the IBM compatibles, and we offer finest quality products with true supermarket sales and lease rates.

Why not test our "Supermarket Concept" by checking today, to see why CFI Memories belongs in your future.

**Disc Packs.... our only business.**

**CFI**

Memories, Inc.

1432 ALLEC STREET  
ANAHEIM, CALIFORNIA 92805  
To expedite, (714) 776-8571

January 19, 1972

Page 13

## Random Notes

**Batch-Oriented 'Autotab' Released by Capex Corp.**

PHOENIX—Autotab, a financial planning software package that has been in use on the GE time-sharing network for the past year and a half, is now available for in-house use on IBM 360/370 or Honeywell 600/6000 CPUs from the developer, Capex Corp. The package is designed to allow non-programming users to generate forecasting, business modeling, budget systems, sales analysis, cash flows, returns on investments without help from the DP staff. It operates in batch environment, or under JRE, CRJME or TSO. In 60K bytes on a 360, it is available for \$7,500 on a perpetual license from Capex at 2613 N. Third St., 85004.

**Real Property Income Studied By Altan Package With B3500**  
SUNNYVALE, Calif.—Banks, real estate developers or brokers, with access to a Burroughs B3500, are able to simulate investments in income-producing real property in great detail, with the Real Estate Investment Analysis Modeling software from Altan Associates Corp., 505 W. Olive Ave., 94060.

Within the model, the results of statistical analyses of a large number of input parameters are integrated to produce sophisticated investment guidelines. The \$10,000 model is capable of estimating parameters when actual data is unavailable.

**Piping Compared to Local Codes By Service From Texas Company**  
HOUSTON—Engineers concerned with the design of piping systems and their isometric drawings to Engineering Technology Analysts Inc., 3318 Richmond Ave., 77006, for stress analysis and checking against applicable piping codes.

The service supports power, petroleum, gas and nuclear piping systems.

**NCR Police Software Extended**  
DAYTON, Ohio—NCR has released additional modules of the Law Enforcement software designed for use on Century Series CPUs. A Control and Translate module builds files and handles input validation for other segments of the system. The Case Inventory unit is described as the operational module of the system, keeping users posted on current actions.

A Police Information module maintains the master files on wanted persons and stolen property, generating reports appropriate to those areas. The Case Inventory and Police Information modules lease for \$8,100 each. The others are available without cost.

**BA Broadens Payroll Service**  
SAN FRANCISCO—Subscribers to the Bank of America payroll service, particularly manufacturers, wholesalers, retailers and contractors, can have more comprehensive management information reporting through new features in the service.

The payroll service has been extended to provide for the withholding of state taxes, as recently enacted. In addition, the service is said to combine information from the payroll and payables service into one managerial report resulting in better control and a clearer distribution of material and labor costs.

**TBI, Scopus Services****Quality of New, Old Tapes Checked**

By Don Leavitt

Magnetic tape-oriented installations should be able to operate with higher levels of confidence in the physical condition of their files, through the use of either or both of two new services. Those users who buy their own tapes can have them tested by Time Brokers Inc. (TBI) under its Tape Quality Control Service. Established libraries can be brought up to fixed standards of quality, and then maintained at those levels, through a tape purchase-lease back plan offered by Scopus Corp., Lowell, Mass.

Under TBI's new service, users receiving shipments from their tape vendor, forward a percentage of the order to TBI, without opening the original shipping cartons. TBI tests each reel on its electronic equipment and provides a comment on test graph when the tapes are returned to the user.

TBI says that it can check any half-inch magnetic tape, either 7-or 9-channel, and charges \$.50/reel, with no minimum price per test session. The firm is at 500 Executive Blvd., Elmsford, N.Y., 10523.

**IBM FDPs Aid Hospitals, Clinics**

WHITE PLAINS, N.Y.—Half a dozen new Field Developed Programs (FDPs) from IBM can help hospitals and clinics solve a variety of accounting problems. Four of the programs are used on System 3 hardware; the others, on larger equipment.

Two of the System 3 programs focus on patient accounting while the others support accounts payable and inventory control functions. Users of IBM's Shared Hospital Accounting System (Shas), on 360/370 CPUs, can pick up support for Medicare accounting with another of the FDPs, and users of IBM 1800 systems are provided specialized hospital data acquisition capabilities with the last of the new programs.

One of the simpler programs for a card-oriented S/S, Medicare Billing, handles the routine processing and billing for patients and provides management reports and printing of government-supplied forms to fulfill Medicare requirements.

The Clinical Accounting package, geared to a disk-based S/S, can also generate Medicare forms, but outputs conventional patient accounting statements as well. Insurance statements and revenues and expense summaries are also available with this FDP.

Data needed to control payments to vendors, including both the writing and reconciliation of checks, are available with the General Stores Accounts Payable package, while inventory management, including generation of purchase orders, is provided by the General Stores Inventory package. Both of these FDPs are for card-oriented S/Ss.

The Shas Pending Insurance Claims Accounting, on a 360/370, maintains a file of claims forwarded under the Medicare Part A program.

Each of the FDPs is available under license agreement with monthly charges for the first 12 months of use, after which charges are waived. The charges range from \$100/mo for General Stores Inventory system to \$1,185 for Hospital Data Collection and Communication.

The Scopus purchase-lease back plan is intended to overcome contamination and physical damage caused by poor library procedures and mishandling of the tapes. During the first year of the plan, all of the user's tapes will be evaluated on Scopus equipment, the company said.

Tapes that are found to have an unacceptable number of errors, a criteria established by the user and not Scopus,

can be retired and replaced.

The user has the option of specifying the manufacturer of the replacement tapes, the company added.

Once the library has been brought up to the user's chosen quality level, Scopus performs periodic cleaning, component inspection and replacement and continuing evaluation of the tapes in service.

Scopus can be contacted through P.O. Box 1241, Lowell, Mass. 01852.

**Program Backs Systems Planners**

PITTSBURGH—Systems and programmer analysts can reduce the time needed to create and maintain system specifications, and programmer can cut sharply into the time needed to code Cobol programs, with the Program-m-1 utility software from Comdata Services.

The program generates record layouts, file I/O flowcharts and selective identification, Environment and Data Division Cobol source statements, or any combination of these options, all in a single pass of the system.

While the package is designed to show the make-up of individual files and their relationships to programs within a system, it does not consider internal program logic. It creates neither Procedure Division code nor detailed program logic flowcharts.

The Cobol source statements generated by Program-m-1 can be directed to

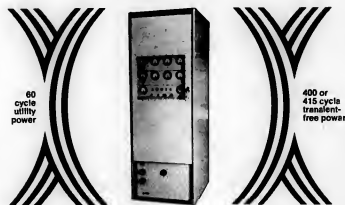
punched cards, tape or disk, and ultimately outgassed on a user library, to be combined with conventionally coded Cobol program logic as input to a compiler.

The file I/O flowchart symbols are similar to or conform to those recommended or adopted by Ansi. Supplementing the standardized shapes, however, Program-m-1 also prints the specific type of device on which the designer expects the file to run.

The software operates under either DOS or OS/360 in 48K of memory, with a disk or tape.

Program-m-1 is available in object form for \$565, including documentation, a supply of specification sheets and six months of support.

Comdata Services is at 530 Sixth Ave., 15219.

**400 CYCLE  
COMPUTER POWER  
ALL SOLID STATE**

Every year more CPUs require 400 cycle power. Now IBM's 370/165 and 370/195 utilize 415 Hz AC power, and the new 370/215, 370/225, 370/235, 370/245, 370/255, 370/265, 370/275, 370/285, 370/295, 370/305, 370/315, 370/325, 370/335, 370/345, 370/355, 370/365, 370/375, 370/385, 370/395, 370/405, 370/415, 370/425, 370/435, 370/445, 370/455, 370/465, 370/475, 370/485, 370/495, 370/505, 370/515, 370/525, 370/535, 370/545, 370/555, 370/565, 370/575, 370/585, 370/595, 370/605, 370/615, 370/625, 370/635, 370/645, 370/655, 370/665, 370/675, 370/685, 370/695, 370/705, 370/715, 370/725, 370/735, 370/745, 370/755, 370/765, 370/775, 370/785, 370/795, 370/805, 370/815, 370/825, 370/835, 370/845, 370/855, 370/865, 370/875, 370/885, 370/895, 370/905, 370/915, 370/925, 370/935, 370/945, 370/955, 370/965, 370/975, 370/985, 370/995, 370/1005, 370/1015, 370/1025, 370/1035, 370/1045, 370/1055, 370/1065, 370/1075, 370/1085, 370/1095, 370/1105, 370/1115, 370/1125, 370/1135, 370/1145, 370/1155, 370/1165, 370/1175, 370/1185, 370/1195, 370/1205, 370/1215, 370/1225, 370/1235, 370/1245, 370/1255, 370/1265, 370/1275, 370/1285, 370/1295, 370/1305, 370/1315, 370/1325, 370/1335, 370/1345, 370/1355, 370/1365, 370/1375, 370/1385, 370/1395, 370/1405, 370/1415, 370/1425, 370/1435, 370/1445, 370/1455, 370/1465, 370/1475, 370/1485, 370/1495, 370/1505, 370/1515, 370/1525, 370/1535, 370/1545, 370/1555, 370/1565, 370/1575, 370/1585, 370/1595, 370/1605, 370/1615, 370/1625, 370/1635, 370/1645, 370/1655, 370/1665, 370/1675, 370/1685, 370/1695, 370/1705, 370/1715, 370/1725, 370/1735, 370/1745, 370/1755, 370/1765, 370/1775, 370/1785, 370/1795, 370/1805, 370/1815, 370/1825, 370/1835, 370/1845, 370/1855, 370/1865, 370/1875, 370/1885, 370/1895, 370/1905, 370/1915, 370/1925, 370/1935, 370/1945, 370/1955, 370/1965, 370/1975, 370/1985, 370/1995, 370/2005, 370/2015, 370/2025, 370/2035, 370/2045, 370/2055, 370/2065, 370/2075, 370/2085, 370/2095, 370/2105, 370/2115, 370/2125, 370/2135, 370/2145, 370/2155, 370/2165, 370/2175, 370/2185, 370/2195, 370/2205, 370/2215, 370/2225, 370/2235, 370/2245, 370/2255, 370/2265, 370/2275, 370/2285, 370/2295, 370/2305, 370/2315, 370/2325, 370/2335, 370/2345, 370/2355, 370/2365, 370/2375, 370/2385, 370/2395, 370/2405, 370/2415, 370/2425, 370/2435, 370/2445, 370/2455, 370/2465, 370/2475, 370/2485, 370/2495, 370/2505, 370/2515, 370/2525, 370/2535, 370/2545, 370/2555, 370/2565, 370/2575, 370/2585, 370/2595, 370/2605, 370/2615, 370/2625, 370/2635, 370/2645, 370/2655, 370/2665, 370/2675, 370/2685, 370/2695, 370/2705, 370/2715, 370/2725, 370/2735, 370/2745, 370/2755, 370/2765, 370/2775, 370/2785, 370/2795, 370/2805, 370/2815, 370/2825, 370/2835, 370/2845, 370/2855, 370/2865, 370/2875, 370/2885, 370/2895, 370/2905, 370/2915, 370/2925, 370/2935, 370/2945, 370/2955, 370/2965, 370/2975, 370/2985, 370/2995, 370/3005, 370/3015, 370/3025, 370/3035, 370/3045, 370/3055, 370/3065, 370/3075, 370/3085, 370/3095, 370/3105, 370/3115, 370/3125, 370/3135, 370/3145, 370/3155, 370/3165, 370/3175, 370/3185, 370/3195, 370/3205, 370/3215, 370/3225, 370/3235, 370/3245, 370/3255, 370/3265, 370/3275, 370/3285, 370/3295, 370/3305, 370/3315, 370/3325, 370/3335, 370/3345, 370/3355, 370/3365, 370/3375, 370/3385, 370/3395, 370/3405, 370/3415, 370/3425, 370/3435, 370/3445, 370/3455, 370/3465, 370/3475, 370/3485, 370/3495, 370/3505, 370/3515, 370/3525, 370/3535, 370/3545, 370/3555, 370/3565, 370/3575, 370/3585, 370/3595, 370/3605, 370/3615, 370/3625, 370/3635, 370/3645, 370/3655, 370/3665, 370/3675, 370/3685, 370/3695, 370/3705, 370/3715, 370/3725, 370/3735, 370/3745, 370/3755, 370/3765, 370/3775, 370/3785, 370/3795, 370/3805, 370/3815, 370/3825, 370/3835, 370/3845, 370/3855, 370/3865, 370/3875, 370/3885, 370/3895, 370/3905, 370/3915, 370/3925, 370/3935, 370/3945, 370/3955, 370/3965, 370/3975, 370/3985, 370/3995, 370/4005, 370/4015, 370/4025, 370/4035, 370/4045, 370/4055, 370/4065, 370/4075, 370/4085, 370/4095, 370/4105, 370/4115, 370/4125, 370/4135, 370/4145, 370/4155, 370/4165, 370/4175, 370/4185, 370/4195, 370/4205, 370/4215, 370/4225, 370/4235, 370/4245, 370/4255, 370/4265, 370/4275, 370/4285, 370/4295, 370/4305, 370/4315, 370/4325, 370/4335, 370/4345, 370/4355, 370/4365, 370/4375, 370/4385, 370/4395, 370/4405, 370/4415, 370/4425, 370/4435, 370/4445, 370/4455, 370/4465, 370/4475, 370/4485, 370/4495, 370/4505, 370/4515, 370/4525, 370/4535, 370/4545, 370/4555, 370/4565, 370/4575, 370/4585, 370/4595, 370/4605, 370/4615, 370/4625, 370/4635, 370/4645, 370/4655, 370/4665, 370/4675, 370/4685, 370/4695, 370/4705, 370/4715, 370/4725, 370/4735, 370/4745, 370/4755, 370/4765, 370/4775, 370/4785, 370/4795, 370/4805, 370/4815, 370/4825, 370/4835, 370/4845, 370/4855, 370/4865, 370/4875, 370/4885, 370/4895, 370/4905, 370/4915, 370/4925, 370/4935, 370/4945, 370/4955, 370/4965, 370/4975, 370/4985, 370/4995, 370/5005, 370/5015, 370/5025, 370/5035, 370/5045, 370/5055, 370/5065, 370/5075, 370/5085, 370/5095, 370/5105, 370/5115, 370/5125, 370/5135, 370/5145, 370/5155, 370/5165, 370/5175, 370/5185, 370/5195, 370/5205, 370/5215, 370/5225, 370/5235, 370/5245, 370/5255, 370/5265, 370/5275, 370/5285, 370/5295, 370/5305, 370/5315, 370/5325, 370/5335, 370/5345, 370/5355, 370/5365, 370/5375, 370/5385, 370/5395, 370/5405, 370/5415, 370/5425, 370/5435, 370/5445, 370/5455, 370/5465, 370/5475, 370/5485, 370/5495, 370/5505, 370/5515, 370/5525, 370/5535, 370/5545, 370/5555, 370/5565, 370/5575, 370/5585, 370/5595, 370/5605, 370/5615, 370/5625, 370/5635, 370/5645, 370/5655, 370/5665, 370/5675, 370/5685, 370/5695, 370/5705, 370/5715, 370/5725, 370/5735, 370/5745, 370/5755, 370/5765, 370/5775, 370/5785, 370/5795, 370/5805, 370/5815, 370/5825, 370/5835, 370/5845, 370/5855, 370/5865, 370/5875, 370/5885, 370/5895, 370/5905, 370/5915, 370/5925, 370/5935, 370/5945, 370/5955, 370/5965, 370/5975, 370/5985, 370/5995, 370/6005, 370/6015, 370/6025, 370/6035, 370/6045, 370/6055, 370/6065, 370/6075, 370/6085, 370/6095, 370/6105, 370/6115, 370/6125, 370/6135, 370/6145, 370/6155, 370/6165, 370/6175, 370/6185, 370/6195, 370/6205, 370/6215, 370/6225, 370/6235, 370/6245, 370/6255, 370/6265, 370/6275, 370/6285, 370/6295, 370/6305, 370/6315, 370/6325, 370/6335, 370/6345, 370/6355, 370/6365, 370/6375, 370/6385, 370/6395, 370/6405, 370/6415, 370/6425, 370/6435, 370/6445, 370/6455, 370/6465, 370/6475, 370/6485, 370/6495, 370/6505, 370/6515, 370/6525, 370/6535, 370/6545, 370/6555, 370/6565, 370/6575, 370/6585, 370/6595, 370/6605, 370/6615, 370/6625, 370/6635, 370/6645, 370/6655, 370/6665, 370/6675, 370/6685, 370/6695, 370/6705, 370/6715, 370/6725, 370/6735, 370/6745, 370/6755, 370/6765, 370/6775, 370/6785, 370/6795, 370/6805, 370/6815, 370/6825, 370/6835, 370/6845, 370/6855, 370/6865, 370/6875, 370/6885, 370/6895, 370/6905, 370/6915, 370/6925, 370/6935, 370/6945, 370/6955, 370/6965, 370/6975, 370/6985, 370/6995, 370/7005, 370/7015, 370/7025, 370/7035, 370/7045, 370/7055, 370/7065, 370/7075, 370/7085, 370/7095, 370/7105, 370/7115, 370/7125, 370/7135, 370/7145, 370/7155, 370/7165, 370/7175, 370/7185, 370/7195, 370/7205, 370/7215, 370/7225, 370/7235, 370/7245, 370/7255, 370/7265, 370/7275, 370/7285, 370/7295, 370/7305, 370/7315, 370/7325, 370/7335, 370/7345, 370/7355, 370/7365, 370/7375, 370/7385, 370/7395, 370/7405, 370/7415, 370/7425, 370/7435, 370/7445, 370/7455, 370/7465, 370/7475, 370/7485, 370/7495, 370/7505, 370/7515, 370/7525, 370/7535, 370/7545, 370/7555, 370/7565, 370/7575, 370/7585, 370/7595, 370/7605, 370/7615, 370/7625, 370/7635, 370/7645, 370/7655, 370/7665, 370/7675, 370/7685, 370/7695, 370/7705, 370/7715, 370/7725, 370/7735, 370/7745, 370/7755, 370/7765, 370/7775, 370/7785, 370/7795, 370/7805, 370/7815, 370/7825, 370/7835, 370/7845, 370/7855, 370/7865, 370/7875, 370/7885, 370/7895, 370/7905, 370/7915, 370/7925, 370/7935, 370/7945, 370/7955, 370/7965, 370/7975, 370/7985, 370/7995, 370/8005, 370/8015, 370/8025, 370/8035, 370/8045, 370/8055, 370/8065, 370/8075, 370/8085, 370/8095, 370/8105, 370/8115, 370/8125, 370/8135, 370/8145, 370/8155, 370/8165, 370/8175, 370/8185, 370/8195, 370/8205, 370/8215, 370/8225, 370/8235, 370/8245, 370/8255, 370/8265, 370/8275, 370/8285, 370/8295, 370/8305, 370/8315, 370/8325, 370/8335, 370/8345, 370/8355, 370/8365, 370/8375, 370/8385, 370/8395, 370/8405, 370/8415, 370/8425, 370/8435, 370/8445, 370/8455, 370/8465, 370/8475, 370/8485, 370/8495, 370/8505, 370/8515, 370/8525, 370/8535, 370/8545, 370/8555, 370/8565, 370/8575, 370/8585, 370/8595, 370/8605, 370/8615, 370/8625, 370/8635, 370/8645, 370/8655, 370/8665, 370/8675, 370/8685, 370/8695, 370/8705, 370/8715, 370/8725, 370/8735, 370/8745, 370/8755, 370/8765, 370/8775, 370/8785, 370/8795, 370/8805, 370/8815, 370/8825, 370/8835, 370/8845, 370/8855, 370/8865, 370/8875, 370/8885, 370/8895, 370/8905, 370/8915, 370/8925, 370/8935, 370/8945, 370/8955, 370/8965, 370/8975, 370/8985, 370/8995, 370/9005, 370/9015, 370/9025, 370/9035, 370/9045, 370/9055, 370/9065, 370/9075, 370/9085, 370/9095, 370/9105, 370/9115, 370/9125, 370/9135, 370/91



# Any media storage cabinet you buy now may be obsolete before it is delivered...

**before you buy, find out about the improved storage efficiency and cost advantages of new optimedia™ cabinets**

Two years ago we decided that it didn't make much sense to keep designing cabinets that were locked-in to the storage of cards only or tape only or one type of disk pack. So we studied the total media storage problem from all angles and came up with what we believe is the ideal solution. optimedia™ coordinated cabinets can store all types and sizes of data processing media. They can store them in virtually any combination you desire, and — when your storage requirements change, optimedia cabinets can adapt to the changes. They're sort of a "living" storage system that won't become obsolete or leave you with excess capacity for one medium and not enough for another.

optimedia™ coordinated cabinets have other benefits such as "Action Level" storage that lets you place all media at the most convenient retrieval height, smooth operating roll up doors that open all the way leaving the entire inside fully accessible, and up to 20% extra storage capacity when, compared to other cabinets with the same outside dimensions.

So . . . hold up that purchase requisition until you can hear the full story on optimedia™ coordinated cabinets. That way you may avoid buying something that's obsolete before it's delivered.

For the complete story on optimedia™ coordinated cabinets, call your local Wright Line office. You'll find it listed in the yellow pages in all major cities or contact us by writing direct or circling the readers' service number. Wright Line, a Division of Barry Wright Corporation, 160 Gold Star Boulevard, Worcester, Massachusetts 01606.



MEDIA MANAGEMENT SYSTEMS

## The Forum and Exhibition Schedule

### Each Day

9:00-9:40

#### Keynote Address

**Day One — Lawrence Feldman**  
Mr. Feldman will address the entire audience from 9:00 to 9:40. His subject is data entry, and his experience makes him an expert in this field. Currently he is President of Management Information Corporation of Cherry Hill, New Jersey and editor of *Data Entry Today*. He's an instructor at Drexel University, and recently collaborated with George Bernstein on a 15-year study and projection on the DP Industry.

#### Day Two — Dr. Dixon Doff

Dr. Doff will speak on Data Communications. He is an acknowledged expert in this field, and does consulting work in addition to his activities as a faculty member of the Eastern Michigan University graduate school of business. He is also President of the Ann Arbor Chapter of the ACM.

#### Day Three — Charles Lecht

Mr. Lecht's subject is Operational Efficiency. He is an internationally known speaker, consultant, and author. His programming books are recommended reading for the CDP exam of the DPMA, and he has prepared several lectures for the American Management Association. Mr. Lecht is President of Advanced Computer Techniques of New York.

Each of these speakers will also observe the panel discussions and deliver a summary during the conference luncheon.

9:40-10:30

#### Panel Discussion

Panelists are regional experts in the particular field. They have first-hand experience with the latest equipment and services, and they are known in their areas for their progressive management principles. They are not representatives of computer manufacturers.

Principles and operations are the target for discussion, not equipment suppliers. General questions are encouraged.

10:40-11:45

#### Workshops

Each panelist leads a workshop — and this is where your specific questions are discussed and worked out. Where the discussion goes depends on your needs. What do you, the user, want to learn or discuss?

12:15-1:30

#### Conference Luncheon

The keynote speaker summarizes the important points of the day's panels and workshops over a pleasant lunch.

1:00 PM-9 PM

#### Exhibits Open

You've listened and talked all morning. Now you can see the latest equipment and services in action. 60 exhibitors present their latest, in a pleasant, uncrowded exhibit hall.

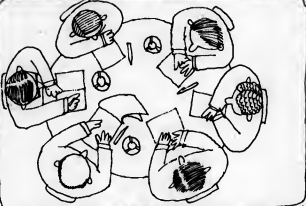
## 9:00-9:40 KEYNOTE ADDRESS



## 9:40-10:30 PANEL DISCUSSION



## 10:40-11:45 WORKSHOPS



## 12:15-1:30 CONFERENCE LUNCHEON



## TOPICS

On each day of our three-day show we are devoting our forums to a particular topic of wide current interest to computer users.

### First Day

#### DATA ENTRY

The keynote session on data entry is followed by panels and workshops on

- Key punch Replacement: key to tape, disk and cassette devices
- OCR
- Intelligent Terminals (distributed processing)
- Direct Data Entry/Source Data Automation

### Second Day

#### DATA COMMUNICATIONS: THE CHOICES

The keynote address deals with the overall picture, and is followed by panels on these subjects:

- Communications equipment from mainframe makers and common carriers
- Communications equipment from independent suppliers
- Data Transmission via private (lines, microwave) networks
- Data Transmission via carriers (lines, microwave)

### Third Day

#### OPERATIONAL EFFICIENCY

Panels and workshops deal with the following topics:

- Core Extensions
- System Utility Software Modification
- Independent Peripheral Usage
- Dedicated Systems vs. General Purpose Computers

## EXHIBITORS

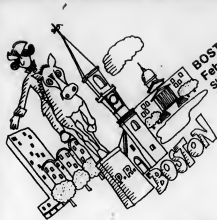
The following is a partial list of exhibitors:

- Lockheed Electronics Company
- California Computer Products, Inc.
- Nover Corporation
- Sanders Data Systems, Inc.
- Incoform Corporation
- Inform, Inc.
- Centronix Data Computer Corporation
- Ibmec, Inc.
- Hewlett-Packard Company (Computer)
- Trendata Computer Systems Corporation
- Technon Industries, Inc.
- Boeing Computer Services, Inc.
- Graham Magnetics, Inc.
- Digital Equipment Corporation
- Eastman Kodak
- Varian Data Machines
- Tally Corporation
- Interdata
- Syntex, Inc.
- Nashua Corporation
- Hazeltine Corporation
- Applied Data Research
- Texas Instruments Incorporated (Digital Systems Division — Houston)
- Versatec, Inc.
- Intel Corporation
- Input Output Computer Services, Inc.

# THE COMPUTER CARAVAN IS BRINGING 60 to put 85% of the computer users in of new products, new services

The Computer Caravan is sponsored by Computerworld. And it's designed to give you a chance to spend one, two or three days at a nearby, uncrowded, professionally oriented seminar and exhibition. You'll be discussing the topics that interest you with experts in the field. Experts who are user-oriented. Who know your problems and have first-hand experience with the state of the art. Then you'll have a chance to see the latest equipment and services in action, as 60 companies show you what they have to offer.

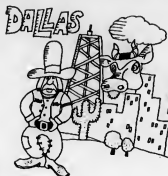




**BOSTON**  
Feb. 22-24  
Shirley Boston/  
Hyman Memorial Auditorium

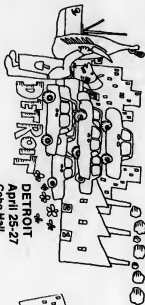


**LOS ANGELES**  
April 4-6  
The Ambassador

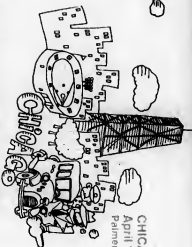


**DALLAS**  
March 21-23  
Market Hall

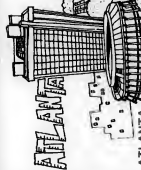
**SAN FRANCISCO**  
April 10-12  
Fairmont Hotel



**DETROIT**  
April 25-27  
Cobo Hall



**CHICAGO**  
April 18-20  
Palmer House



**ATLANTA**  
March 14-16  
Regency Hyatt House



**NEW YORK**  
Feb. 29-March 2  
Americana Hotel



**WASHINGTON**  
March 7-9  
Washington Hilton

## EXHIBITORS TO 9 CITIES FOR 1 REASON

### the United States within 2 hours and expert advice.

Some of the details are above. The rest will follow in Computerworld. And we'll see you there when the Computer Caravan opens in a city near you. If you'd like exhibitor information, just call or write Charlie Asmus at Computerworld, 797 Washington Street, Newton, Mass. 02160. (617) 332-5606.

## THE COMPUTER CARAVAN

*It's Coming.*

## THE COMPUTER CARAVAN

A New York Area Computer Users' Forum and  
Exposition Is Coming To



NEW YORK  
Feb. 29-March 2  
Americana Hotel

Sponsored by Computerworld  
(617) 332-5566



The Novar 7-70 Data Collection System receives data from Novar terminals via phone lines and records it in IBM computer compatible format—9 track, 800 bpi—on 8½" reels. It will also transmit data to Novar terminals.

Complete with minicomputer and software.

**NOVAR**

Novar Corporation • 2370 Charleston Road  
Mountain View, Calif. 94040 • (415) 964-3900  
Offices in Principal Cities

**GTE INFORMATION SYSTEMS**

## Inventory Management - Part III

### Orders Can Anticipate 'Lumpy' Demand

By Richard T. Lilly

Special to Computerworld

As noted last week, there must be sufficient documentation so that upper management can establish inventory policies, examine the effect of those policies and consider alternatives. But any system will fail when users (on all levels) are unable to comprehend its contents.

To that end, documentation must be good enough to allow operating management to understand the principles and theories involved in the

In prior installments, Lilly showed how inaccurate balance-on-hand amounts can be controlled, and outlined a comprehensive warehouse control report for management's use. Here he cites the hazards of ineffective documentation in general, and details how "lumpy" demand can be anticipated.

system, and operating personnel to understand the reports, exceptions and actions to be taken on a day-to-day basis.

The system's documentors must be careful not to become too technical in system's explanation for the user. Technical explanations where required should be in an appendix.

Other documentation should be:

- Definition of terms used in the documentation.

- Definition of reports, their function and action to be performed.

- Layout of all input.

- System flow.

- Action to be taken based on exception output.

- Data control procedures.

Each person at all levels of control should have sufficient information to enable him to manage his portion of the system, however small. Lack of this information is a system malfunction.

Most sophisticated inventory control systems use some types of averaging techniques to forecast demand for future periods. One of the main benefits to be gained by computerization of inventory is the measurement of the error in the forecast (the Mean Absolute Deviation) and its use in established safety stock to meet a required level of customer service.

Most often overlooked, however, is the fact that a number of items do not have a demand which is predictable, due to their "lumpy" character. A lumpy item, one which, for example, has a low volume except for two successive periods.

If the Mean Absolute Deviation of the item based on a horizontal (constant) model is greater than 60% of the average, it can be assumed to be lumpy.

When a lumpy item is treated as a constant item, an excessive amount of inventory is often generated since the safety stock is too large. Yet even with this value of inventory, the two large demands may not be satisfied. Therefore, we must establish two reorder policies to be used with lumpy items, based on peaks and valleys of demand.

The user must decide whether he can justify carrying a higher level of inventory to accommodate the high demand (peak) that occurs infrequently. If this is justifiable, the reorder point is based on the large peak demands for an item.

If not justifiable, the reorder point will be based on the low volume demands (valley). Unless an item is specifically designated as a peak reorder point item, a valley reorder point will be computed.

For valleys compute the average of all demands less than the original average, then compute the reorder point equal to the valley average  $X \text{ Lead-time} + 2$ .

For peak reorder point, compute the average of all demands through a lead time for all lead time demands greater than the original average through the lead time. Then compute the reorder point equal to this peak average times a safety factor. This safety factor should be greater than 1, and less than 2.0. An initial value of 1.3 is suggested.

These are the Seven Deadly Sins of Computerized Inventory Control. We have encountered few systems which did not contain a number of these problems. If we list them again...

- Lack of adjustment filter.
- Inability to trace rejected transactions.
- Inability to trace updated transactions.
- No control of floating requirements.
- Lack of continuing management control.
- Insufficient user documentation.
- Ignoring the presence of lumpy demand.

... we see that all are expressed as: "lack of," "inability to," etc.

Thus, the system designer must ensure that, upon implementation, full audit trail control is available at all levels of management.

One final suggestion must be added to overlay the Seven Deadly Sins. Please, please, please do not ignore the need for initial and continuing participation on the part of operating management, beginning with the system design, through implementation and continuing with constant maintenance and supervision of the inventory management system.

Richard T. Lilly is president of Manufacturing Management Sciences Inc., Burlington, Mass.

# CHI CORE

offers 1130 and 1800 users  
up to 65K of add-on high speed  
core storage for 50% less  
than IBM.

Write for a CHI CORE brochure with specifications and information.

Computer Hardware Inc.  
2550 Fair Oaks Boulevard  
Sacramento, California 95825  
Phone: 916 - 481-7723

January 19, 1972

Page 19

## Low-Cost 32-bit CPU

## Bits and Pieces

## BTC Allows Mohawk 2400 To Use Complot Plotters

BELLAIRE, Texas — The BTC-7400 Batch Terminal Controller from the Houston Instrument Division of Bausch & Lomb, Inc., enables users of Mohawk 2400 series terminals to attach Complot Incremental Plotters.

The interface can be installed in less than one hour and allows automatic plotting up to speeds of 300 step/sec using the Complot DP-1 or DP-3 plotter. Software to generate plot codes for transmission to MDS 2400 systems is supplied.

The BTC-7400, with plotter stand, is priced at \$2,445. Delivery is 30 days from 4950 Terminal Ave., 77401.

**Datum Printer Increases Speed Of PDP-8 Output by Factor of 10**  
ANAHEIM, Calif. — The Datum line 5098 Line Printer Series is designed to provide PDP-8 users with a tenfold increase in printer output at a price of under \$3,000.

The printer system operates at 100 char./sec and consists of a serial impact printer, controller, software and cables.

The unit features the production of six copies, and prints the 64-characters upper case Ascii subset, with other formats available. The unit is currently available from 170 E. Liberty Ave., 92801.

**TST 717 Replaces IBM 2741**  
ROCKVILLE, Md. — The TST 717, a selective-based data communication terminal designed to replace the IBM 2741, is priced 10% to 15% below the IBM unit.

The terminal, from TST Communications, Inc., operates at 15 char./sec and includes as standard equipment several features that are options on the 2741. These include: dial up, interrupt and Typematic keys. The rental price of the IBM unit so equipped is \$108.50/mo.

The TST 717 is available on a 30-day delivery schedule from 2351 Shady Grove Road, 20850.

**Winder Has Automatic Clutch**  
KANSAS CITY, Mo. — The I-Winder punched paper tape winder from Inland Office Products features an automatic clutch that regulates tension and controls the speed of the winding.

The unit has an aluminum case and operates from 110V. The price is \$85 and shipment is from stock from 1720 Cherry St., 64108.

PORT LAUDERDALE, Fla. — The Systems 85 real-time processor from Systems Engineering Laboratories, Inc., a lower powered version of the company's Model 86, is described as the lowest price 32-bit computer system available.

Competitive in performance with such machines as the XDS Sigma 5 and the DEC System Ten, the Systems 85 offers prices that are from 20% to 40% lower, SEL and last week.

Compared to the SEL Model 86 which has a 600 msec cycle time, the Model 85 has a cycle time of 850 msec and prices that are 10% to 20% lower.

The Systems 85 is available with core memory expandable from 8K to 128K words, with memory byte parity and page protection standard. The 85 requires one terminal to address any bit, byte, half-word, word or double word in memory.

Total data handling capacity of the Systems 85 is 1.17 million words/sec. Up to 16 simultaneous device controller channels, each of which can handle one or more peripherals, can be attached to the computer's I/O bus.

The Systems 85 is hardware and software compatible with the 86. Software available includes operating systems for real-time multiprogramming and for batch processing. Real-time Monitor (RTM) provides a software priority structure for concurrent execution of up to 255 tasks, and permits job-stack processing in a background mode.

Both the Batch Processing System (BPS) and RTM support a variety of language

processors including extended Fortran IV, macro assembler, debug conversion programs, utilities, debug routines and diagnostics.

Prices for the Systems 85 range from \$150,000 for a 32K system with a teletypewriter to more than \$400,000. Lease prices start at \$1,200/mo with one-, three-, and five-year arrangements available. First deliveries will be made in July 1972.

A complete line of peripherals is available for use with the Systems 85. These include ISS and CDC disk drives, both fixed and moving head types and CDC

magnetic tape drives.

A comparison of the Systems 85 against similar configurations of the DEC System Ten and the XDS Sigma 5 reveals the following. The prices of the systems are roughly comparable, with the XDS and DEC systems both somewhat higher, at about \$199,000 and \$213,000, respectively, while the SEL system is priced at \$180,000.

Cycle time of both the SEL and XDS systems is 850 msec and the DEC is 1.0 msec. The number of instructions performed/dollar is 2.5 on the Systems 85, 1.8 on the Sigma 5 and 1.9 on the DEC System Ten.

## Royco 205A Monitoring System Prevents Damage to Disk Drum

MENLO PARK, Calif. — An automatic maintenance monitoring system for rotating memory devices from Royco Instruments, Inc. is designed to protect the user against head crashes.

The Model 205A is intended to ease maintenance procedures for disk packs and drives by automatically detecting particle build-ups that can cause data errors, failures or head crashes, the company said.

Up to 10 memory units, either disks or drums, can be monitored by a single Royco device.

Unit deterioration caused by dirt, pack



Royco 205A Components

warpage, oil bearing leaks, or other mechanical trouble in the drive can be detected.

Excessive particle counts trigger an alarm lamp, sound an audible signal and, optionally, retract the read/write heads to prevent disk or drum damage.

The Model 205A automatic maintenance monitor system, complete with underlaid mounting valve manifold and sensor plus a maintenance level indicator module and auto-sequencer/alarm panel, sells for \$3,400 and less for \$105/mo. Delivery is 30 days from 141 Jefferson Drive, 94025.

## Tape Cleaned in 5 Minutes

TARZANA, Calif. — The Mark IV magnetic tape cleaner from Data Devices, Inc. uses no consumable supplies.

The device removes oxide clumps, dirt and foreign particles from tape using a cylindrical blade to clean the oxide while a screen cleaner is used for the backing. At the rate of 180 in./sec., a two-pass cleaning takes five minutes.

Priced at \$2,300, the Mark IV is available on two-week delivery from 18360 Topham St., 91356.

## Programmed Terminal Uses ROM

CAMBRIDGE, Mass. — The Series 200 line of programmable alphanumeric CRT terminals from Computek, Inc. combine the best features of both programmable and hardwired systems.

The program for the terminal is stored in nondestructible ROM. New programs are easily constructed, according to the company. Replacements are made by exchanging plug-in program boards. The flexibility of programming is retained, without the sacrifice of reliability and convenience, the company said.

The Computek 200 can be programmed to generate locally, verify, edit and manipulate large data files, either as a single unit or as part of a multiple-unit configuration. A wide range of I/O peripherals, including hard copy devices, mag tape cassettes, disks, badge readers and printers can be controlled by the terminals. Local processing, such as subediting and tax computation, can be performed.

Serial RS-232C interfaces allow the

handling of 110 to 9,600 bit/sec data rates. Parallel interfaces, allowing data transfer at rates of up to 350,000 bit/sec to most computers, are also available.

As many as 4K 16-bit words of microprogramming can be stored in the MOS ROM. A display refresh buffer, consisting of 2K 10-bit words, is provided.

The display consists of a 14 in. screen displaying 80 char./line and 25 lines/page. The 64-character Ascii set includes upper and lower case formed by a 9 by 13 dot matrix. Refresh rate is 60 frame/sec.

The 68-key keyboard includes a set of 10 for numerics or special functions and includes controls for full cursor movement, local editing functions and system operations.

Local editing, logic functions and control can be programmed.

The price of a single stand-alone terminal is \$4,570. Delivery is 90 days from 143 Albany St., 02139.

**SOME  
PRINTERS  
NEVER  
QUIT.**

**SEND FOR THE FACTS.**

**CENTRONICS**

Centronics Data Computer Corp.  
One Wall St.  
Hudson, N.H. 03051  
603-883-0111

## THE COMPUTER CARAVAN

THE NORTHWESTERN COMPUTER USERS'  
FORUM AND EXPOSITION IS COMING TO  
SAN FRANCISCO



April 10-12  
Fairmont Hotel

Sponsored by Computerworld (617) 332-5066

## Univac Offers DP Disk

BLUE BELL, Pa. — Univac 400 and 1100 units will be able to replace their Fastrand II magnetic drums with a disk system that has been added to the Univac 8400 disk series.

Acquired from Data Products, Inc., which offered the device as the 1108-compatible 7114, the 44 million word unit features a minimum access time of 10 msec, three times faster than the Fastrand II. Average latency time is 17 msec compared to 35 msec for the Univac unit.

In most respects the disk is compatible with the drum. Both have 64 sector/track with 28 36-bit word/sector. The transfer rate of the disk is significantly higher than the drum at 262KC compared to 158KC.

Rotational speed of the disk is 1,800 rpm compared to 880 rpm for the Fastrand II. The number of read/write heads on the former 7114 at 40 is about 2/3 that of the 64 heads on the drum.

Univac has not announced the disk drive prices, but they are expected to differ not too greatly from the price set by Data Products at 35% less than the \$3,750/mo charged by Univac for its Fastrand II.



High Speed Card Terminal

## Futronics Terminal Processes 112 CPM

FREEDPORT, N.Y. — The High-Speed Card Terminal from Futronics, Inc. is the first unit available to punch, interpret and read cards at speeds as high as 112 card/min, according to the company.

Intended for on-line data processing either as a stand-alone unit or as part of a system, the terminal features read-after-punch capability, and can repunch a new card after an error is detected.

The terminal can also be used as a keypunch, with an optional keyboard. The unit is priced at \$18,000. Delivery is 90 days from 178 Hanse Ave., 11520.

## Corpak Reduces Cost Of PDP-8 Memory

LOS ANGELES — The Corpak-8 from Information Control Corp. will allow DEC PDP-8 users to save up to 36% on the cost of add-on memory, ICC said.

The user with a PDP-8/1 with 8K of memory who wishes to expand it would have to pay \$10,600 for each 8K from the mini manufacturer. The price of the ICC add-on is \$6,400 for the first 8K and \$3,132 for each 4K after that, up to the computer's limit of 28K of add-on.

Corpak-8 memories are available from 9610 Bellanca Ave., 90045.

## Software Enhancements Added to Data Editor

MINNEAPOLIS, Minn. — Data Action has added several no-cost software enhancements to its 1500 Data Editor System.

The Data Editor is a mini-based system used to edit and validate data prepared on a key-to-tape system for computer input. The enhancements include a report writer, enhanced data editing and validating capabilities, generalized tape-to-print and a data file update utility.

A typical 1500 Data Editor System including a magnetic tape drive, 300 line/min printer and CPU, leaves for \$2,300/mo. The software enhancements are immediately available from 4445 W. 77th St., 55435.

## Potter VIP Plan Encourages User Diversification

MELVILLE, N.Y. — The Potter Instrument Co. announced a multi-product/prompt payment incentive plan designed to encourage users to use more than one Potter product line and to pay monthly rentals promptly.

Called the Volume Incentive Plan (VIP), it provides a sliding scale of discounts based on the number of different products leased and the promptness of payment. The plan includes tape drives, disk drives, printers, controllers, memories and data communications equipment.

Potter Instrument Co. is at 532 Broad Hollow Road, 11746.

## Correction

In CW, Dec. 29-Jan. 5, the monthly rental of the Nanodata QM-1 should have been \$7,000/mo.

# Two ways to save money on practically any time-sharing service.



Model 33 ASR  
acoustically  
coupled terminal.  
\$65 per month.

Model 35 ASR  
for data access  
arrangement  
\$75 per month.

With about 150 in the U.S. there is no shortage of time-sharing services. What there is a shortage of, is low-cost terminals and service for them.

So about a year ago we decided to offer terminals that would be compatible with virtually every time-sharing service. And we offered terminals at the lowest prices ever. Add to that nationwide support and it's not surprising that we have leased literally thousands of terminals.

We offer models for every purpose. The Model 33 ASR with acoustic coupler works with any standard telephone. And we can

provide Model 33 or Model 35 for use with Data-Phone® or data access arrangements.

Regardless of which data terminal configuration you select, you can depend on Western Union Data Services Company for nationwide servicing, applications engineering, training and support.

Interested in the most economical and efficient data terminal for your needs?

Contact me at Western Union Data Services Company, 16 McKee Drive, Mahwah, New Jersey 07430. Phone: 201-529-1700. Outside N.J. call toll-free 800-631-7050. Telex: 12-5077.

\*Registered trademark of AT&T.



western union data services company

## DEC COMPUTERS BUY, SELL, RENT, TRADE NEW OR USED

We also have Computer Terminals  
**DELOS COMPUTER EXCHANGE**  
100 State Street Boston, Mass. 02109  
Dept. 1A (617) 272-4654

## UPGRADE NOW!

**THE NEW 4100  
DATA TERMINAL**  
Instantly updates  
your system with  
PLUG-IN-ABILITY  
at LOW COST!



We know that the 4100 Data Terminal will outperform and update existing paper tape equipment to magnetic tape without modification costs. That portability and built-in dual interfaces adapt the 4100 Terminal to any system, including on-line and off-line application and incremental or batch processing. That it has off-the-shelf availability and is surprisingly inexpensive. In fact, we know that the 4100 Data Terminal is far more sophisticated, more advanced, more applications-oriented, and will give you a far greater range of performance than any other cassette terminal on the market today. We know because we engineered it that way. If you'd like to know more, call or write for a demonstration soon!

**TECHTRAN  
INDUSTRIES**

580 JEFFERSON ROAD, ROCHESTER, NEW YORK 14623 PHONE 716-271-7950

## MIT Gets Grant For DP Library

CAMBRIDGE, Mass. — The Council on Library Resources has granted \$400,000 to MIT to support for one year an experimental, computer-operated technical library that could be a prototype for information retrieval systems in libraries.

The heart of Project Intrex (Information Transfer Experiments) is an IBM 7094 programmed in accordance with MIT's time-sharing system which allows it to be used simultaneously by many persons from remote access terminals.

The Intrex data base, stored in the computer on magnetic disk, contains a growing technical library of detailed catalog information and microfilm texts of more than 15,000 recent articles in the field of materials science and engineering.

The Intrex user conducts literature searches by typing out questions and commands on the keyboard of a remote access terminal. The computer instructs the novice how to use the system as he proceeds, and anyone who can type the word "begin" (the code word for the instruction program) can start work almost at once.

### 'Run' Is Small-Core 'Run'

SEATTLE — The University of Washington has developed a small-core version of RUN, the Fortran compiler for the Control Data 6000 series computers. The miniaturized processor, which has been distributed to 15 other installations, is named, appropriately enough, Run.

## 10 KEY NUMERIC PAD

- Designed for use with any terminal... Ascii, EBCDIC, Baudot
- Adding machine keyboard arrangement
- Terminal keyboard remains fully operational
- Eight additional option keys — no add'l charge
- Single key CR-LF-XO-RO
- Can be used on or off line
- Portable — connects/disconnects in seconds
- Unit price \$295.00 Availability 30 days
- Reps Wanted



**EASTERN DYNAMICS CORP.** 616-231-8800  
1158 Suffolk Ave., Brentwood, N.Y. 11717

## FROM NEW DRESSER

Special File Folders  
for Magnetic Cards  
Used in IBM's MC/ST\*



Handles cards and related documents  
Letter and legal sizes  
Left and Right Hand Pockets (no equalize file holder)  
Available with 1, 2 or 4 pockets  
Six colors for efficient file coding  
Also available for word processing equipment using paper tape.

\*Magnetic  
Card Selector  
Typewriter

Send for  
free catalog  
covering Dresser's  
complete line of data  
processing accessories.

DRESSER PRODUCTS CORPORATION

P. O. Box 2036, Providence, Rhode Island 02905, Tel. (401) 781-4430

# The Bookie

There are 1,150 legal bookies in the big city. Sleek Wyle CRT display terminals which are part of New York's off-track betting system.

Why was Wyle awarded this \$2.5 million contract by Computer Sciences Corporation? Experience, know-how & fiscal responsibility!

Wyle also has a direct replacement for the IBM 2260/2845 CRT clusters with more features for less money.

For expertise in CRT displays & terminals, look to Wyle Computer Products.

**WYLE COMPUTER PRODUCTS, INC.**

A Subsidiary of Wyle Laboratories  
128 Maryland St., El Segundo, Ca. 90245 (213) 678-4251

# SOFTWARE CONSULTING FIRMS

The use of proprietary software packages can yield significant savings in the time and cost of implementing a new computer application. You can perform a valuable service for your clients by assisting them in locating and evaluating proprietary software whenever a new application is being considered. By offering this service, you are in an ideal position to assist in the definition of software requirements, and in the modification and installation of packages obtained by the client as a result of your recommendations.

We are seeking affiliations with firms interested in broadening their range of activities to include services related to proprietary software packages. We will provide national advertising, a reference library of information concerning software packages currently on the market, and other services in support of firms qualifying for affiliation with SYSX. For further information, contact:

**SYSX**

Hans Schroeder, President  
Systems Exchange Company  
1100 El Camino Real  
Mountain View, Ca. 94040  
Telephone: (415) 328-5490

## Position Announcements

## PROGRAMMER

\$14,000

New England, Telecommunications. Leading Mfg. large sophisticated system. Desirable suburban area, salary & living nearby.

executive search  
Albany, N.Y. 12211 Box 11034

## RESUME FACTS

Design your own Professional DATA PROCESSING RESUME by knowing the essential format and information to include. Send \$2.00 for a complete self-analysis and RESUME KIT to:

North-American Computer Associates  
2200 South State St. Suite 1616  
Chic., Ill. 60606  
(312) 838-9225

## OPPORTUNITY IN 1972

MKTG. MGR. - Peripherals via  
Leasing companies. \$45,000  
SYS. ANAL. - Brokerage, Data  
Communications. N.Y.C. and  
\$20,000  
SYS. ENGR. - Data Commu-  
nications systems. \$30,000  
SL'S REP. - IBM Core Assoc. Co.  
PAL, CHI, NYC, ATL, DC  
DALLAS, OHIO. \$20,000  
SL'S REP. - Data Commu-  
nications. N.Y., Seattle, DC, Chicago,  
Cleveland, LA, FLA, Phila., San  
Diego, Dallas, Albany, others. \$15,000

APPLIC. ENGR. - Data Com-  
munications. N.Y., Phila., DC, Boston,  
others. \$20,000  
PROD. ANAL. - Data Commu-  
nication Systems. N.Y., San Fran-  
cisco, Dallas, Chicago. \$16,000  
F.D., SVCS/CC. - Maintenance  
and 360/505 peripherals. Major  
city. \$15,000

Call or write now!

Bruni Associates, Inc.  
360 North Broadway  
Jersey City, N.J. 07310  
(616) 822-7940

Buy  
Sell  
Swap

Immediate  
Availability

1311 Mod 2  
1311 Mod 2

Wanted To Buy  
\$2500.00 or 82

CAC

Dept. A, P.O. Box 20185  
San Jose, CA 95126

Circle 177 on Reader Service

Don't Get A 370!

FOR SALE AS PRINCIPAL

I.O. Set - \$7900

20400 - \$205,000

28041 - \$2000

42311 - \$7,500 w.

WANTED TO PURCHASE

20306 12 Mic CPU

COMPUTER FINANCIAL, INC.

Please contact Gary Cranberry

or Bob Miller

1432 Allee St.

Anaheim, Calif. 92805

(714) 776-8571

## TEACHING POSITIONS

Opportunities exist in a growing  
Computer Science Department  
for instructor (MS required) and  
assistant professor (Ph.D. re-  
quired) to teach programming,  
operating systems, or information  
structures. Begin in February, or  
September, 1972. Send resume to:  
J.L. Dillon; Chairman; Computer  
Science, Sacramento State Col-  
lege, CA 95819, or if qualified,  
call (916) 942-6045.

## JOBS JOBS JOBS

WHY IGNORE the world's  
largest employer of EDP per-  
sonnel? Over 30,000 posi-  
tions; 5000 CPU's. Information  
for all geographic areas.  
Extensive advice and specific  
recommendations for se-  
curing jobs with the Federal  
Government. Send \$4.00 to:  
The Washington Consultants  
Department 23  
P.O. Box 3800  
Washington, D.C. 20016

## RESULTS ORIENTED

SENIOR SYSTEMS ANALYSTS  
and PROGRAMMERS  
Our growth demands profes-  
sionals to plan and develop  
management systems. We need ex-  
perienced individuals to develop a  
distributed tape & disk environ-  
ment with various users and  
data communications. Profes-  
sional with 3-5 years of valid  
background and positive initiative  
should contact the national leader  
in the medical-imaging field.  
Send resume and references to:  
Recruitment Personnel Department  
Star Line - Blue Arch  
4401 E. Forest Ave. Suite 200  
Columbus, South Carolina 29206

Assistant Director for Systems  
and Planning, Office of In-  
stitutional Research in a major  
campus university in the New  
York metropolitan area. Masters  
or equivalent in management/  
computer science; several years  
experience in design and implemen-  
tation of machine related man-  
agement information systems;  
with at least two years in a supervisory  
capacity in an institution of  
higher education. Immediate  
opening; send resume specifying  
qualifications and salary require-  
ments to CW Box 2545, Com-  
puterworld, 707 Washington St.,  
Newbury, Mass. 02160.

## BUY SELL SWAP

CWC  
DEAL WITH PROFESSIONALS

FOR SALE

360-40 H \$2595K

360-40 G \$1995K

360-30 P 2.0µm 57K

360-30 F 1.0µm 100K

MAKE OFFER FOR

284-1/2 (240-1/2) 240-1/2

407-A3 284-1/2

360-1400 Compat. Feature 4457

Andrew (Dick) Calloway

Suite 441, NDC Bldg.

New Orleans, La.

(504) 581-7741

DATRONIC RENTAL CORPORATION

will dramatically improve your

Price Performance Ratio by offering

lease options on 350 Systems and

peripheral equipment. Available

equipment includes: 360/50, 360/30,

360/1 Mod 5 & 6, 2311, 1403.

Send Saving NOW By Calling or

Writing Today!

DATRONIC RENTAL CORPORATION

541 N. Western Parkway

Chicago, Illinois 60656

(312) 952-0749

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## ICX

Intercontinental  
Computer  
Exchange

ICX NATIONAL, INC.  
a subsidiary of Intercontinental  
Computer Exchange, Inc.

INTERNATIONAL COMPUTER  
EQUIPMENT

a division of ICX-National, Inc.

"Specializing in the acquisition, sale  
and leasing of Data Processing Equip-  
ment"

FOR PURCHASE

All IBM 360 Equipment plus IBM  
370 Delivery Programs

FOR SALE OR LEASE

IBM/HONEYWELL/UNIVAC/CDC  
CIC/BURROUGHS/DEC  
Systems & Components

Completely reconditioned and  
guaranteed for OEM M/A. Delivered  
Worldwide.

Call or Write:

Date P. Lewis (202) 446-2244

1600 L Street N.W.

Washington, DC 20036

Pat Baker (813) 931-5515

1010 Route 6E

Overland Park, Kansas 66112

Mark Lutz (714) 776-2212

304 Vista Del Mar

Redondo Beach, Calif. 90277

FOR RENT

IBM

086-\$105 per mon.

084-\$215 per mon.

548-\$50 per mon.

514-\$95 per mon.

024-\$35 per mon.

Rates based on 30 day  
rental period & include

IBM M/A

(312) 852-1308

WANTED TO BUY

360's

350/30

360/40

1403 N1

Peripheral Units

Corporate

Computers Inc.

420 Lexington Ave.

New York, N.Y. 10017

(212) 532-1200

SAVE UP TO 90% ON

COMPUTER VIDEO TAPE - NASA

propose surplus. Used but guaran-  
teed reusable. Top brands - Honey-  
well, IBM, RCA, Ampex, IBM. Thou-  
sands sold firms, colleges, etc. Digital  
1/2" x 2400' 1800 psi, \$3.50/yd x  
2400', \$4.50; IBM 7330/3470  
hyperf tape Cartridges, new, ready  
for tape drive, \$15. 10 for \$125.  
Information 1/2" x 2400' \$15. 10  
for \$125. Video tape 3" x 3600',  
\$15 x 7200 ft, \$15. 10 for \$125. 1/2"  
x 2400' \$15. 10 for \$125. 1/2"  
x 1800 ft, 1 mil., 7' reels, \$3.50. 10  
for \$35. Certified disposal with  
Self-destruction guaranteed.

General Supply (713) 743-3550

Box 14828 Houston, Texas 77211

FOR SALE

360 Mod 30's

Two 32K and 64K-Both 1.5µs

Available Immediately

(913) 381-7272

BUY? SELL? TRADE? LEASE?

COMPARE OUR MARKET!

UNIT DESCRIPTION NEW COST USED PRICE

1231-1 IBM Optical Scanner \$22,405 \$6,500

1403-2 IBM Printer \$18,000 \$15,000

2040-6 IBM 360/6 (1728) loaded \$360,000 \$200,000

WANTED: 360/30 14K, 2401-5 tape drive, 2803-2 tape controller.

For full details call today to Tom Morris at (214) 631-5647.

P.O. Box 47729

Dallas, Texas 75247

Tradacom, Inc.

The Professional data processing dealer

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## BUY SELL SWAP

## WANTED IBM 360's



BUY SELL SWAP	TIME FOR SALE	TIME FOR SALE	SOFTWARE FOR SALE	SOFTWARE FOR SALE
<b>1410-40K System</b> <b>\$30,000</b> <b>1401-F-System</b> <b>\$25,000</b> <b>729-2 Tapes</b> <b>\$5500</b>  <b>DATA EQUIPMENT INC.</b> 3306 W. Walnut Suite 304 Garland, Texas 75042 (214) 272-7581	<b>OHIO</b> <b>GREYHOUND COMPUTER CORPORATION</b>  Cleveland's Largest Data Center 360/30 65K and 131K available at all times 2203 Superior Avenue (216) 861-1300 <b>CALIFORNIA</b> 360/50/40/30 COMPUTER TIME AVAILABLE Russ Reiland (313) 366-5340 <b>TKACOR COMPUTING CORP.</b> 3807 Wilshire Blvd Los Angeles, Calif. 90010 <b>TIME FOR SALE</b> 360/40 256K 360/40 128K 360/30 65K Competitive Rates Call: Informatics, Inc. (415) 892-1651	<b>NEW YORK</b> <b>370 / 155</b> Time available all shifts Tel. T. Doyle (212) 867-4947 <b>NEW JERSEY</b> <b>SYSTEM/3 MOD 10 - DISK</b> * Time Available - All Shifts * Convenient Location * Reasonable Rates * Key Punch Support Available Tel. Don Thee (201) 272-4380 <b>Program Development?</b> <b>360/65</b> All Shifts Available Free Office Space Quick Turnaround Call (609) 921-8550 Ask for Bob Periman <b>APPLIED DATA RESEARCH</b> Princeton, N.J.	<b>PROGRAMMER-I</b> <b>S/360 - 48K - TOS,</b> <b>DOS, OS</b> A systems analyst programming old developed to utilize specification for the production of program source statements, additional specifications and documentation. <b>GENERATES:</b> Control Source Statements Program Record Layouts File I/O Flowcharts <b>REDUCES TIME &amp; EFFORT FOR:</b> Preparing Specifications Documenting Programs <b>MINIMIZES:</b> Program Source Coding Key punching For information call or write: <b>Comdata Services</b> 530 Sixth Avenue Pittsburgh, Pennsylvania 15219 (412) 381-3887 <b>AREAS II</b> <b>BALANCE FORWARD</b> <b>ACCOUNTS RECEIVABLE</b> 1. Simplicity of Input 2. Advanced Credit Management Reporting 3. Aging To 180 Days 4. Fixed Fee Billing Optional 5. Sales Analysis in Depth Other financial and inventory control programs now available for purchase include: open item accounts receivable, accounts payable, payroll, job cost, general ledger, inventory record keeping and inventory management. For information call or write: John E. Finch Vice President, Marketing <b>COMPUTER WARE, INC.</b> P.O. Box 3101, Birmingham, Ala. 35222 - Phone 352-956-011	<b>TOTAL ON-LINE SYSTEMS SOFTWARE AND HARDWARE</b> <b>FOR S/360 and S/370</b> MINERVA GENERAL PURPOSE ON-LINE SYSTEM handles all of your applications in one small region or partition and requires no applications programming. <b>CURRENT APPLICATIONS INCLUDE:</b> bill-of-materials, order entry, inventory, payroll, customer information, check entry and verification, purchase order, demand deposit, savings, credit authorization, credit bureau data base management, factoring, commercial loans, engineering and estimating, student registration, and library information systems. WE CAN DEMONSTRATE YOUR APPLICATION USING YOUR EXISTING FILES REGARDLESS OF YOUR INDUSTRY OR APPLICATION. TELFIE, 2702, and TTY communication controllers with one programable unit and up to 256 synchronous and asynchronous lines for a typical annual savings of \$10,000 to \$20,000. <b>ADL SERIES 760 VIDEO TERMINALS</b> can replace your IBM 2260/284, 2270, and TTY compatible terminals at savings up to 50%. <b>CONTACT</b> Tony Westerling (213) 870-6431 <b>Pacific Western Co.</b> Information Systems Div. 1663 Euclid Street Santa Monica, Calif. 90404 <b>GCS, INC.</b> <b>Offers....</b> <b>BANKING APPLICATIONS</b> Installment Loan Savings Commercial Loan Personal Term Loan Stock Transfer Pension/Profit Sharing DOS/OS 32K User References Available <b>General Computer Services, Inc.</b> 1383 Meridian Street, NE P.O. Box 5148 Huntsville, Alabama 35805 (205) 539-9499
<b>AVAILABLE FOR SALE</b> 360/50's 360/40's 360/30's ALSO Immediately Available 2865-2 CORE 3960-2 SELECTOR CHANNEL PAUL NORMAN, PRESIDENT <b>BOOTH COMPUTER MARKETING INC.</b> 210 Park Avenue, New York (212) 760-6400	<b>ILLINOIS</b> <b>IBM 360/270 USERS</b> Computer Time Available (370/155) 768K, 3330, 2314, 2701, 10 240's 1M6, O/S or O/S 8am-6pm 8pm-8am TUE, \$120/hr. Weekdays ..... \$110/hr. \$90/hr. 12 hr. blk. weekend ..... \$100/hr. \$80/hr. (370/145) 256K, 3330, 2314, 6 240's 1M6 600-1600 8am-6pm 8pm-8am Weekdays ..... \$110/hr. \$75/hr. Weekends ..... \$45/hr. \$35/hr. 12 hr. blk. weekend ..... \$40/hr. \$35/hr. (360/30) 64K, 5 disk, 5 tape 8am-6pm 8pm-8am Weekdays ..... \$50/hr. \$40/hr. Weekends ..... \$33/hr. \$27/hr. For further information call: DON ELLIS (312) 822-6141	<b>Software for Sale</b> <b>FOR SALE AT SIGNIFICANT SAVINGS</b> <b>IBM 360/65 COMPUTER</b> * 512 K Core (Equipped for Expansions) * 3-Selector & 1 Multiplexor Channels * Maintained at Current Levels * Console Typewriter * 7070/74 Emulator Capability <b>ADDITIONAL EQUIPMENT AVAILABLE</b> * 9 - 2401/6 Tape Drives * 2 - 2403 Controllers Available Approximately April 16, 1972 Details Upon Request Contact: Mr. P.J. Hildebrandt <b>Atlantic Ritchfield Company</b> P.O. Box 2619 Dallas, Texas 75221 (214) 747-6461 <b>*General Ledger</b> <b>*Accounts Payable</b> Management responsibility reporting, Multiple company processing, Chart of accounts independence. Installed in 5 days. <b>ANCOM</b> ...The Financial Systems Firm L.A. 8929 S. Sepulveda (213) 549-1618 N.Y. (212) 248-4324 Houston (713) 464-3127 Honolulu (808) 955-6631 Boston (617) 532-7050 Chicago (312) 986-1346 San Diego (714) 236-6462 Cincinnati (513) 362-0778	<b>DOS RUN YOUR PRODUCTION (ANY LANGUAGE) IN ANY PARTITION WITH ANYPLACE</b> UNLIMITED POST-PROCESSOR FOR SELF-RELOADING HAROLD JAMES ALEXANDER 2040 Oxford Ave. Suite C, W-344 418-973-0185 <b>PAYROLL PERSONNEL LABOR OIST</b> <b>PAS - 1</b> WE INVITE COMPARISON <b>BRADY TOWER, INC.</b> 10000 Wilshire Blvd. Beverly Hills, Calif. 90210 (213) 976-8864, 887-8883 <b>MMS GENERAL LEDGER</b> is hard at work for over 25 of the biggest US corporations to FIND OUT WHAT THEY KNOW THAT YOU DON'T CALL: Boston 617-272-2870 New York 212-986-2515 San Francisco 415-427-4870 Atlanta 404-255-0039 Dallas 214-625-5095 Philadelphia 609-228-1100 California 916-421-0600 15-421-0426 <b>Software International Corporation</b> 279 Cambridge Street Burlington, MA. 01803 *No Accounts Receivable, Accounts Payable, Inventory Management and Gross Requirements package.	
<b>Time for Sale</b> <b>MASSACHUSETTS</b> <b>Much More!</b> Raw machine time everybody's got. Machine time plus applications plus professional service that's got the difference is better throughput, value, performance. The Machine - IBM 360/65 ... OS ... 1.5 million bytes of core ... 32 2314's online ... two printers ... CALCOMP plotter ... telecom applications and more ... The Applications - IMS ... all ICES programs ... simulations ... CROSS/TRANS ... CULPRIT ... more than 50 programs and languages under one roof. The Service - A full staff of professional systems analysts keep jobs running smoothly ... open every day, 24 hours ... remote network serving all terminal types. The largest data service center in New England is ready to serve you. Contact David Morris at 617-648-8550.  <b>370/145</b> 10 Tapes 2314 Disk 0.5-MFT Price Equivalent To A 370/155 360/40 <b>ALL SHIFTS AVAILABLE</b> Call: Daylight (617) 237-4000	<b>Computerworld Sales Offices</b> <b>National Sales Manager:</b> Neal Wilder <b>Sales Administrator:</b> Dorothy Travis (617) 332-5606 <b>New England:</b> Robert Ziegler (617) 332-5606 <b>Mid-Atlantic:</b> Donald E. Fagan (212) 594-6644 <b>Midwest:</b> Neal Wilder (312) 944-5885 <b>Los Angeles:</b> Bob Byrne (213) 477-4208 <b>San Francisco:</b> Bill Healey (415) 362-8547	<b>A MONEYMAKER FOR SERVICE BUREAUS:</b> <b>TIMEKEEPING &amp; BILLING PACKAGE FOR CPA's</b> * Adaptable to other companies who use time as a basis for billing * Modular control * Excellent documentation * Needs 8K 360/50 COS/DOS * Competitively priced We sell to only one service bureau in any one city. Contact: Richard Shaw <b>EDP Services Co., Inc.</b> P.O. Box 2848 Culver City, Ca. 90238 (213) 876-8864, 887-8883		



## CI Notes

## IBM Realigns DP Operations

ARMONK, N.Y. — IBM has realigned its Data Processing Group into two operating groups — one for marketing and services, the other for development and manufacturing.

The group responsible for the company's data processing marketing and services will include the data processing, field engineering and advanced systems development divisions. It will be headed by Dean R. McKay, senior vice-president and group executive. McKay was a member of the company's management committee.

The development and manufacturing group, with responsibilities for the company's worldwide computer products line, will include the components, general systems, systems development and systems manufacturing divisions. It will be headed by John R. Opel, senior vice-president and group executive, who was a member of the management committee.

**3330 for 360 Expected Soon**  
NEW YORK — A 3330-like disk system that can be used with the larger models of the IBM 360 line will be announced within a month, sources said here last week.

While almost all of the independent peripheral manufacturers are said to be working on such devices, at least one has a prototype up and working, the sources said, and will announce it soon.

The sources also said that there should be a falloff in the independent disk market, winning the number of firms in the business to as low as three when deliveries of the 3330-compatible drives begin by the independents.

## Controls May Aid Simulation

NEW YORK — Wage/pricing controls will be beneficial to computer simulation during 1972, as firms will increasingly use corporate modeling "to prove their case" to wage/pricing boards, according to Jackson S. Goursaud, president of On-Line Decisions, Inc.

In proving its case for price increases, management must not only prove the increases are "justified" but demonstrate they will not result in an increase in pretax profit margins. To do this, firms will have to protect productivity changes, he said.

"The increasing use of computer modeling will result in programming efficiencies during the year ahead. Moreover, the increased use of interactive models will result in lower time-sharing costs," he said.

## Supershorts

Singer's Friden Division has changed its name to Business Machines Division of The Singer Co.

Orders totalling approximately \$1 million for computer output microfilm (COM) systems received by California Computer Products, Inc. in December indicate that this previously unimportant segment of the computer graphics business may achieve a 12% per year growth rate through 1975, according to Lester L. Kilpatrick, Calcomp president.

## Second Industry Forecast

## Communications to Pace DP Growth

PHILADELPHIA — Paced by increases in data communications, the computer industry will resume its formerly high levels of growth, according to Auerbach Corp. here.

Auerbach is the second major research firm to report on future directions of the computer industry, and its conclusions pretty well match those reported by International Data Corp. (IDC, Jan. 12), in that both firms see the computer industry resuming a high level of growth.

The U.S. computer industry will enjoy sustained growth throughout the remainder of this decade, Isaac L. Auerbach, president said, but an increasing dependence on foreign markets, and a general recrudescence to the market will be required to realize this success.

## "Slightly Lower"

"Despite unfavorable economic conditions, a diminishing of the domestic customer base, and a general maturing of the industry, future growth rates of the computer industry will be only slightly lower than those of recent years," Auerbach said.

"There will be a shift in emphasis from

technological changes to the development of integrated systems in which hardware and software are accorded equal status in the solution of a user's specific problems.

"In addition, users of computers have become more conscious of costs and more aware of the critical impact of their computer operations on the successful functioning of their daily business operations. As a result the user is no longer content to take whatever the computer manufacturers offer. They are beginning to know how computers can best be applied to their needs and are demanding a new responsiveness from suppliers," he said.

Advances in data communication technology will be a major stimulus to the expansion of the computer industry in the U.S., virtually setting the pace for the development of the industry during the 1970s, he added.

Small computer systems will emerge with the highest growth rate during the next five years, an average rate of 22% per year in gross shipments and 21% per year in installed base, the firm said.

Medium computer systems will have the second highest growth rate, mainly be-

cause of growth in the foreign market. The installed base of these computer systems is expected to grow at the rate of 17% per year. By contrast, medium computer systems in the U.S. will grow at a rate of only 12%, indicating that a modest level of market saturation now exists.

Large computer systems will enjoy the second highest growth in the U.S., about 15%, due mainly to the trend toward on-line data communications systems. In terms of dollars, the installed base of large computer systems worldwide is expected to increase from \$7.3 billion in 1970 to \$17.7 billion in 1976.

Extra-large computer systems will experience the lowest growth rate in the worldwide installed base, averaging 13% yearly. Demand for extra-large computer systems will be stimulated mainly by large sophisticated data base management systems which will begin to attain operational status and wider acceptance during the 1970s.

Data communications growth is best characterized by Auerbach by the fact that the installed computer base possessing data communications capability will increase from 20% in 1970 to 50% in 1976.

While the computer industry generally is maturing, Auerbach points to the theoretical side of computer science as an area of the industry still in infancy.

"The computer field still lacks a scientific base," Auerbach said, "and without it, the development of a comprehensive theory of data processing is impossible. And such a theory is the only sure basis for ensuring the development of an EDP system and of knowing how close to the mark a given computer system has come. To do this the EDP equivalents of physical quantities and properties must be identified."

"Now that the industry is approaching maturity and users are demanding more ambitious and complex application packages, the long-deferred task of coming to grips with the properties of information systems has become acute. We may not see the full development of the required theoretical structures during the 1970s," Auerbach said, "but I believe we will at least see a strong beginning."

## Caravan Highlights Terminals

NEWTON, Mass. — Terminals and data entry equipment will be the major features at the upcoming Computer Caravan, which will travel to nine cities in 10 weeks under the sponsorship of Computerworld.

At the same time, almost every other segment of the computer industry will be represented on the exhibit floor of the Computer User Forum and Exposition which will begin its cross-country trip with a meeting in Boston Feb. 22-24.

"Almost all of the major data entry manufacturers" have already signed up for the show, which is still taking booth reservations, according to Charles Amus, general manager for the show.

In addition, he said that firms representing the minicomputer area will also be prominent on the exhibit floor, with such companies as Lockheed Electronics, Hewlett-Packard, Varian Data Machines,

Interdata and Tixas Instruments planning to show their wares to the more than 25,000 expected visitors.

Several firms are also taking advantage of a new innovation to be offered in conjunction with the Caravan, Amus said. Firms will be allowed, he said, to rent meeting rooms to put on presentations to interested users, away from the convention floor.

Under this arrangement, for example, a firm could give a short tutorial on how to purchase packaged software or how to best select a data entry system or minicomputer, he said.

Besides Boston, the Caravan will travel to New York City, Washington, D.C., Atlanta, Dallas, Los Angeles, San Francisco, Chicago and Detroit. More than 85% of the computer users in the U.S. are within two hours of one of the sites, Amus said.

ATTACH LABEL HERE for address change or inquiry. The label line top may not be removed by you, but it is the only way you have of quickly identifying your records, if you are receiving duplicate copies, please send both labels. Please fasten or know four weeks before you plan to make last name address before and include a current mailing label of your old address.

## CHECK HERE TO ENTER YOUR SUBSCRIPTION

- ☐ 1 year — \$9\* ☐ New subscription  
☐ Payment enclosed ☐ Change of address  
☐ Bill me \*\$10 a year in Canada; \$12 a year in Western Europe and Japan, \$15 a year; Other foreign rates on request.

First Initial	Middle Initial	Surname
Your Title		
Company Name		
Send to: Address		
City	State	Zip Code

Address shown is: ☐ Business ☐ Home

**COMPUTERWORLD**

COMPUTERWORLD • Circulation Department • 797 Washington Street • Newton, Mass. 02160

Please circle one number

## YOUR INDUSTRY

- ☐ 01 Manufacturing  
☐ 02 Chemicals  
☐ 03 Oil & Refining  
☐ 04 Transportation  
☐ 05 Government — Computer or data system  
☐ 06 Marketing — Computer or data system  
☐ 07 Other, associated me  
☐ 08 Other, associated me  
☐ 09 Utilities/Comm  
☐ 10 Finance/Insurance  
☐ 11 Retail  
☐ 12 Finance/Insurance  
☐ 13 Retail  
☐ 14 Education/Medical  
☐ 15 Federal, State and  
☐ 16 Local Govt. Institutions  
☐ 17 Printing/Publishing

## YOUR FUNCTION

- ☐ 01 General Manager  
☐ 02 Systems Administrator  
☐ 03 Programmer  
☐ 04 Data Entry Operator  
☐ 05 Engineering Manager  
☐ 06 Engineer  
☐ 07 R&D  
☐ 08 Consultant  
☐ 09 Librarian/Educator

# New Marketing, Minis Mark GA's Entry Into OEM

NEW YORK—General Automation (GA) has launched a major drive into the OEM mini market with the introduction of nine machines and a new sales policy designed to provide OEM purchasers with "greater freedom in the development, test and shipment of their own products," according to the com-

pany. Six machines are evolved from the firm's SPC-16 family, and three from the SPC-12. Quantity prices start under \$2,000. The new marketing policies "represent an initial step towards providing more latitude to OEM buyers while encouraging them to experiment with new

applications," stated Jay L. Kear, director of sales. The sliding commitment delivery schedule provides up to 12-month delivery leadway for OEM customers, and is designed to eliminate "chargebacks" by the firm for buyers' failures to accept products at the first year's contracted order level.

Under the GA plan, a buyer must allow up to 40% of first systems on schedule at the start-up phase. But he can then delay the beginning of his contract for production unit shipments for up to 12 months beyond the dates of the first unit shipment without any chargebacks.

Under its selective rental plan, GA offers a number of computers, including all necessary peripherals, controllers and software, on a 30-day cancellation

basis. The policy is designed to encourage development of new OEM applications, by eliminating capital outlays during the project prove-out stage.

The double warranty policy provides a 90-day warranty on all products which the OEMer can pass along to the end user.

Under its new discount schedule, GA will allow up to 40% of its new product lines.

## Two Configurations

The SPC-16 minis are available in two configurations. Models 16/40, 60 and 80, designed for the middle range, have a main memory of 4K expandable to 16K, a Teletype control unit, and an "integral" I/O package. Single unit prices are \$5,550, \$6,550 and \$8,550 respectively.

Models 16/45, 65 and 85 can be purchased in small modules on a "bare bones" basis, offering on a 64 peripheral. Unit prices for the 16/45, 65 and 85 start at \$3,950, \$4,950 and \$6,950 respectively.

Models 17/10, 20 and 30 are self-contained control systems with up to 16K memory and software, interfacing and mini-controllers integrated into their modular design. Unit prices are \$2,980 for the 12/10, \$3,480 for the 12/20 and \$3,980 for the 12/30.

Deliveries are slated to begin in March, with 60-day delivery initially. The firm is at 1055 S. East St., Anaheim, Calif., 92805.

**\* WANTED \***  
Firms to: Buy  
Sell  
Lease  
Sub-Lease  
360 Systems

Write or Call Collect—Today  
It's our only business

**COMPUTER SALES, INC.**  
Suite 615 Benjamin Fox Pavilion, Jenkintown, Pa. 19046  
(215) 687-5404

## POTTER Solid State Memories for your 360 give you

- up to double the storage capacity
- higher reliability
- low rental costs
- less Maintenance and downtime
- lower Power requirements
- lower space requirements



The Potter n-channel MOS units utilize 370 technology to give you up to double the storage capacity in less space and for less money than comparable IBM units.

The advanced solid state design lets us package 1024 bits of memory on a single 128 x 128 chip (see cutaway). This results in substantially smaller overall size, lower power requirements and consequent lower power bills and air conditioning load. Another advantage is the elimination of literally tens of thousands of solder connections which are a source of failure in core type memories.

Potter Solid State memories are available for use on 360 models 30, 40, 50 and 65/67... and they are ready for delivery now! In addition to their low cost and many other advantages, Potter Solid State Memories are backed up by a nationwide organization of field service engineers.

For more information on these memories or on Potter's Magnetic Tape Units, Tape Controllers, Disk Drives, Disk Controllers and Line Printers, call your local Potter Sales Representative today. Or, contact Potter Instrument Company, Inc., 532 Broad Hollow Road, Melville, N.Y. 11746 (Phone 516-604-9000).



**POTTER.**

A lot more than less expensive.



## Cogar Sets Financing With Bank, Singer

WAPPINGERS FALLS, N.Y.—Cogar Corp. has announced a financing plan that could bring the financially troubled firm up to \$3.5 million through the sale of stock and bank loans.

Last year the firm lost \$8.3 million on sales of \$1.2 million, up from a loss of \$3.5 million on sales of \$152,161 a year earlier. The firm also has suspended marketing of its System 4 system due to financial problems.

Under the new plan, Cogar will sell 250,000 shares of common at \$5 per share, and if that offering is successful it could obtain loans of up to \$2.3 million.

Potential buyers of the stock will have to make a minimum investment of \$10,000 and will have to agree to hold the stock for at least one year.

If the sale is successful, Chemical Bank will lend Cogar up to \$1.5 million. The bank has the option to let Singer Co. purchase up to \$500,000 of the loan, and if it does, the bank would then lend Cogar an additional \$500,000.

In addition, Cogar would be prohibited from taking any new, special business without the consent of either Singer, Chemical Bank or the Overseas National Bank and Trust Co., which has also invested heavily in the firm.

## Honeywell Predicts Rise

### In '72 Keyplex Shipments

WALTHAM, Mass.—Honeywell Inc. reported that year-end installations of its Keyplex systems number over 100 worldwide with "very high" backlog levels going into 1972.

Edward C. Lund, vice-president and general manager of the firm's North American Operations, projected "significant" increases in both net bookings and shipments for 1972.

The increased shipments will result, in part, from efficiencies realized by the transfer of production work from San Diego to Massachusetts slated for completion this spring, he said. An estimated 60 key personnel are transferring to the Boston area beginning this month.

Lund said bookings for the key-to-disk Keyplex systems "will continue to increase in North America and particularly in European markets such as the United Kingdom, France, Germany, Italy and Spain where Keyplex has been successful."

Keyplex deliveries began in February last year from San Diego. Shipments will begin from Massachusetts plants sometime during the second quarter, he said. No interruption in delivery schedule will result from the production shift, he added.

# Computerworld Stock Trading Summary

TRADE QUOTES

CLOSING PRICES THURSDAY, JANUARY 13, 1971

PRICE							PRICE						
E A C H	1971 RANGE	CLOSE JAN 13	1971 HIGH	JEEK CHANGE	JEEK NET	PCT CHANGE	E A C H	1971 RANGE	CLOSE JAN 13	1971 HIGH	JEEK CHANGE	JEEK NET	PCT CHANGE
SOFTWARE & EDP SERVICES													
O ADVANCED COMP TECH	3-4	1 1/8	0	0.0			N NASHUA CORP	29-30	28 7/8	31 1/4	+ 1/4	+0.5	
A APPLIED DATA RES.	5-13	6 1/4	+ 1/2	+6.0			O REYNOLDS & REYNOLDS	37-43	42 1/2	42 1/2	+3	+2.0	
A APPLIED LOGIC	1-3	3	0	0.0			O STANWARD REGISTER	14-23	18 1/4	1/4	+ 1/2	+1.0	
N AUTOMATIC DATA PROC	4-7	7 1/4	0	0.0			O TAB PRODUCTS CO	5-17	14 1/4	0	0.0		
O AUTO SCIENCES	1-8	1 1/2	+ 1/8	+33.3			N UNIVAC	23-36	26 1/2	+ 1/2	+ 1/2	+10.0	
O COMPUTER NETWORK	2-11	6 1/2	- 1/4	-6.7			A VASHASH MAGNETICS	10-20	23 1/8	1/8	- 1/4	-1.0	
O COMPUTER PROPERTY	5-11	5	0	0.0			COMPUTER SYSTEMS						
N COMPUTER SCIENCES	5-11	6 7/8	- 5/8	-4.4			N BARRONDS CORP	105-160	148 1/8	+6 1/8	-3.0		
O COMPUTER TECHNOLOGY	5-11	6	- 5/8	-4.4			N COLLINS RADIO	10-20	15 1/8	- 1/4	-1.0		
O COMPUTER USES	5-10	10 1/4	+ 1/8	+12.5			N CONTROL DATA CORP	34-53	43 3/4	-3 1/8	-7.7		
O COMP AUTOMAT REPORTS	5-13	7 1/4	0	0.0			N DATA GENERAL CORP	32-55	57 1/4	- 1 1/4	-2.0		
N COMPUTING & SOFTWARE	17-45	22 1/4	- 1/2	-2.1			O DIGITAL CORP	4-24	17 3/4	+2 1/2	+10.0		
O COMTEC	1-4	3 1/4	+ 3/8	+7.2			O DIGITAL EQUIPMENT	51-58	72 1/4	+ 1/2	+4.5		
A COMSHARE	6-10	8 1/8	- 1/4	-4.8			N ELECTRONIC ASSOC.	5-9	6 1/8	0	0.0		
O DATA AUTOMATION	1-6	1 1/2	0	0.0			A ELECTRONIC ENGINEER.	5-10	5 3/8	- 1/8	-4.0		
O DATA PACKAGING	6-10	8 1/8	+ 1/8	+2.4			N FORNBERG	25-46	34 1/4	- 1/8	-1.7		
O DATA SERVICE	1-3	3/4	+ 1/4	+50.0			N GENSLER AUTOMATION	7-20	17	+2 1/2	+25.0		
L DATACORP	4-10	6 7/8	- 1/8	-19.1			N HELLER-PACKARD C3	10-20	16 3/4	1/8	-0.2		
O EDP RESOURCES	5-10	7 1/8	- 1/4	-3.5			N HONEYWELL	33-37	33 1/2	+ 1/2	+1.7		
A ETEL CORP	30-85	50 1/4	+4 1/4	+9.1			N IBM	284-364	341	0	0.0		
N ELECTRONIC DATA SYS.	3-15	9 1/4	+ 1/4	+4.3			O INTERDATA INC	6-11	7 3/4	- 3/8	-4.0		
O ELECTRONICS	6-15	9 1/4	+ 1/4	+4.3			N MCM	25-49	26 1/8	+ 1/8	+2.0		
O E.O.A. DATA CORP	1-3	3 1/2	+ 1/4	+20.0			N MCKINSTRY	23-35	33 1/8	- 1/8	-0.3		
A ETEL	7-18	9 1/8	- 1/4	-4.8			N RAYTHEON CO	27-46	42 1/2	+2	+4.7		
O KEANE ASSOCIATES	6-14	6 1/2	+1	+16.1			N SPECTRUM	23-35	33 1/8	- 1/8	-0.3		
O KEYDATA CORP	5-11	7 1/8	+ 1/8	+5.5			A SYSTEMS ENG. LABS	7-18	10 1/8	- 1/4	-2.2		
A MANAGEMENT DATA	5-11	6 1/8	+ 1/8	+5.5			N VARIAN ASSOCIATES	11-10	14	-3/4	-5.0		
O NATIONAL CSS INC	7-18	10 1/4	+1 1/4	+17.1			N VICTOR COMPUTER	28-40	36 1/8	- 1/4	-4.0		
O NAT COMP ANALYSTS	1-4	3/4	+ 1/4	+20.0			N WING LABS	29-50	36 1/8	- 1/4	-4.0		
P ON LINE SYSTEMS INC	7-18	9 1/8	- 1/4	-4.8			N XEROX CORP	35-127	121 1/2	-4 1/4	-5.3		
N PLANNING RESEARCH	10-26	24 1/2	+ 1/2	+2.1			LEASING COMPANIES						
O PROGRAMMING METHODS	10-29	33 1/4	+ 1/2	+2.1			A BROTHO COMPUTER	11-27	13 1/8	- 1	-7.0		
O PROGRAMMING SYS	2-4	4 1/8	+ 1/2	+13.7			O BROADMAN CORP	5-9	8 1/4	- 1/2	-1.3		
O SCIENTIFIC COMPUTERS	2-4	4 1/8	+ 1/2	+13.7			O COMPUTER EXCHANGE	1-9	2 3/4	+ 1/4	+12.5		
O SIMPLICITY COMPUTER	4-8	3 1/8	0	0.0			O COMPUTER INVESTS GRP	7-14	9 1/8	+ 1/2	+11.0		
O SOFTWARE SYSTEMS	4-8	3 1/8	+ 3/4	+25.0			O DATACORP RENTAL	2-4	2 1/8	0	0.0		
O TBS COMPUTER CENTERS	4-9	3 3/4	- 1/8	-3.5			A DCL INC	5-13	8 1/4	+ 1/4	+3.1		
O TOLLEY INTL CORP	3-8	7 1/8	- 1/2	-1.2			O DESHMAN CORP	12-23	17 1/2	- 1	-5.0		
O TRACOR COMPUTING	2-5	2 1/2	0	0.0			A "PRA" INC.	4-9	7 1/8	- 3/8	-7.1		
O TRISHANE INC	4-15	8	- 1/4	-3.0			A GRAVITE INT	3-7	8 1/2	- 1/2	-6.3		
O UNITED DATA CENTER	2-5	2 1/2	- 1/2	-19.0			A GRESHAM COMPUTER	7-11	8 5/8	+ 1/4	+4.5		
N UNIVERSITY COMPUTING	10-20	18 1/2	- 2 1/2	-11.6			N LEASCO CORP	10-26	17 1/8	- 1/2	-1.3		
A USR SYSTEMS	5-11	6 7/8	- 1/4	-3.5			O ELECTRO MAT INC	3-5	2 7/8	+ 1/8	+15.0		
O VORTEX CORP	2-6	6 3/4	0	0.0			N HCC INDUSTRIES	1-9	8 1/4	- 1/2	-6.3		
PERIPHERALS & SUBSYSTEMS													
N ADDRESSOGRAPH-MULT.	24-48	33 3/4	- 1 7/8	-5.2			A ROCKWOOD COMPUTER	3-5	2 1/4	+ 1/8	+5.0		
O ALPHACRUISE	11-25	20 1/2	+ 1/8	+2.8			O SYSTEMS CAPITAL	3-7	5 1/8	+ 1/4	+11.0		
A AMPEX CORP	1-3	3	+3	+25.0			N V.A. LEASING	10-39	36 1/4	- 1/2	-1.3		
O ANDERSON JACOBSON	5-10	5 3/8	- 1/8	-4.2			EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER						
O ATLANTIC TECHNOLOGY	5-10	5 3/8	- 1/8	-4.0			P=HILL-BALTIMORE						
A BOLT, BERANEK & NEI	4-8	6 3/4	0	0.0			D=TC PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID						
N BUNKER-RAND	5-17	8 7/8	- 1/8	-4.0			(1) TO NEAREST DOLLAR						
A CALCOMP	14-35	30 1/8	- 1/2	-15.3									
O COMTECHNICS	2-5	2 1/4	0	0.0									
O COLORADO INSTRUMENTS	2-5	2	0	0.0									
O COMPUTER COMMUN.	3-7	5 1/4	+ 1/4	+6.0									
A COMPUTER EQUIPMENT	3-7	5 3/4	+ 1/4	+7.1									
A COMPUSET	4-20	6 1/2	+ 1/2	+8.3									
O CONSOL COMPUTER LTD.	1-12	1 1/2	0	0.0									
A DATA PRODUCTS CORP	3-7	5 1/8	- 5/8	-10.0									
O DATA RECOGNITION	3-7	5 1/8	- 5/8	-10.0									
O DATA TECHNOLOGY	3-7	5 1/8	- 5/8	-10.0									
O DIODITRONICS	2-8	3 3/8	+ 1/8	+5.8									
N ELECTRONIC N A M	5-16	9 3/8	- 1	-14.5									
O FASRI-TEC	2-6	2 5/8	+ 1/8	+6.0									
O GENERAL COMPUTER SYS	6-10	10 1/2	+ 1/2	+4.8									
N GENERAL ELECTRIC	33-24	20 1/2	+ 3/4	+9.0									
O INFOCOR INC	3-7	5 1/4	+ 1/4	+6.0									
O INFORMATION DISPLAYS	3-7	5 1/4	+ 1/4	+6.0									
O MANAGEMENT ASSIST	1-2	7/8	0	0.0									
A MARSHALL INDUSTRIES	7-27	11 5/8	+2	+20.7									
N MCHESNA	12-26	20 1/2	+ 1/2	+4.8									
A MILLO ELECTRONICS	12-26	20 1/2	+ 1/2	+4.8									
N MONAC DATA SCI	6-18	8 1/4	- 1 1/2	-6.7									
O OPTICAL SCANNING	6-18	8 1/4	- 1 1/2	-6.5									
O PHOTON	6-12	10 5/8	+ 1/2	+25.0									
A POTTER INSTRUMENT	11-15	5 1/2	+ 1/4	+5.0									
O PRECISION INST.	7-10	10 3/4	+ 1/8	+11.6									
O RECOGNITION EQUIP	1-9	12 1/4	+ 3/8	+8.0									
O RECORD CORP.	1-9	12 1/4	+ 3/8	+8.0									
N SANDERS ASSOCIATES	9-22	16 1/8	+ 3/8	+2.3									
O SCAN DATA	5-15	10 7/8	- 1/8	-5.4									
O TALLY CORP.	0-22	11 3/4	- 1/4	-2.0									
N TELEK	0-22	11 3/4	- 1/4	-2.0									
SUPPLIES & ACCESSORIES													
N ADAMS-HILLIS CORP	9-19	12 1/4	0	0.0									
O BALTIMORE BUS FORGE	8-18	13 1/8	- 1/2	-4.0									
A BARRY ORIENT	7-13	8 5/8	+ 1/2	+8.0									
A DATA DOCUMENTS	1-4	3 1/2	+ 1/2	+12.5									
O DUKES PRODUCTS INC	5-13	12 1/2	+ 1/4	+2.0									
A ENNIS BUS. FORMS	5-13	8 1/2	+ 1	+13.3									
O GRAMM MAGNETICS	9-35	18 1/4	+ 1/4	+14.0									
O GRAPHIC CONTROLS	9-35	18 1/4	+ 1/4	+14.0									
N H&H COMPANY	90-135	130 1/2	-3	-2.2									
O HODGE BUS. FORMS	35-44	41 1/8	- 7 1/2	-18.0									

Computer Stocks Trading Index

Computer Systems      Software & EDP  
Peripheral & Subsystems      Leasing Companies  
Supplies & Accessories      CW Composite Index

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

150  
100  
50  
0

All statistics  
compiled, computed  
and furnished by  
TRADE@QUOTES, INC.  
Cambridge, Mass. 02142

## Earnings Reports

NATIONAL INFORMATION  
SYSTEMS

Nine Months Ended Oct. 31

1971 1970

Revenue 3,564,000 2,936,000

**Who's  
winning in  
Teletype-  
compatible  
CRT's?**

**Hazeltine 2000, the frontrunner. Because  
in CRT terminals too, bloodlines will tell.**



**Hazeltine Corporation**  
Computer Peripherals Equipment

Greenwich, N.Y. 11240 (516) 549-8800  
EAST: NEW YORK (212) 586-1970 □ PHILADELPHIA (215) 618-4348 □  
MIDWEST: MINNEAPOLIS (612) 854-8855 □ CHICAGO (312) 986-1414 □  
SOUTH: DALLAS (214) 233-7716 □ ATLANTA (404) 233-2017 □  
WEST: SAN FRANCISCO (415) 398-0888 □ LOS ANGELES (213) 713-6800 □  
DENVER (303) 388-6844 □  
ST. LOUIS (314) 882-7261 □